

S I N C L A I R

Every Month £1.25 July 1987

DENMARK DKR 40.00

GERMANY DM 9.00

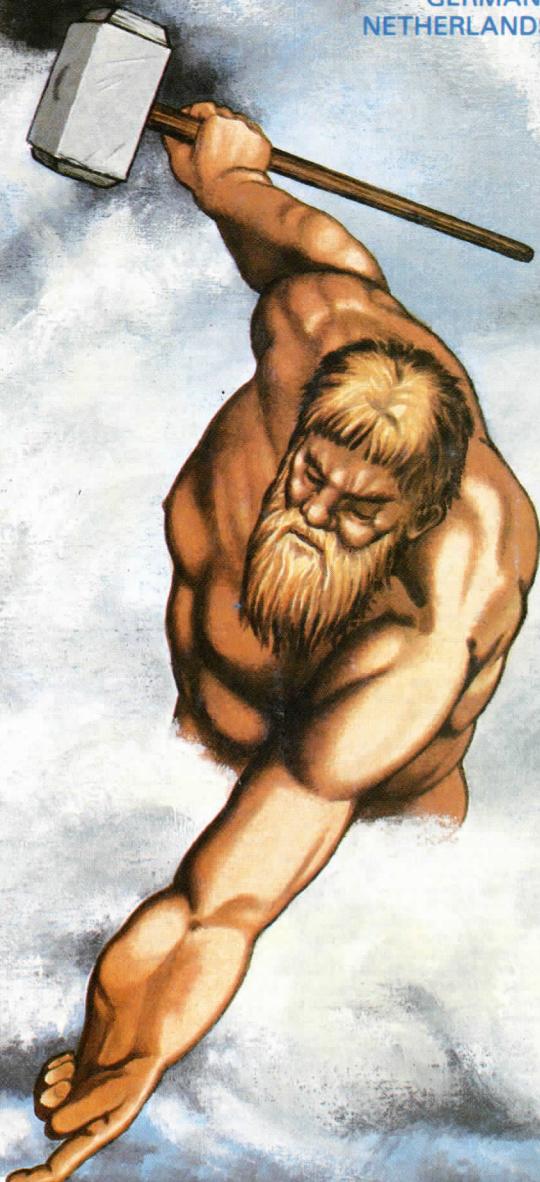
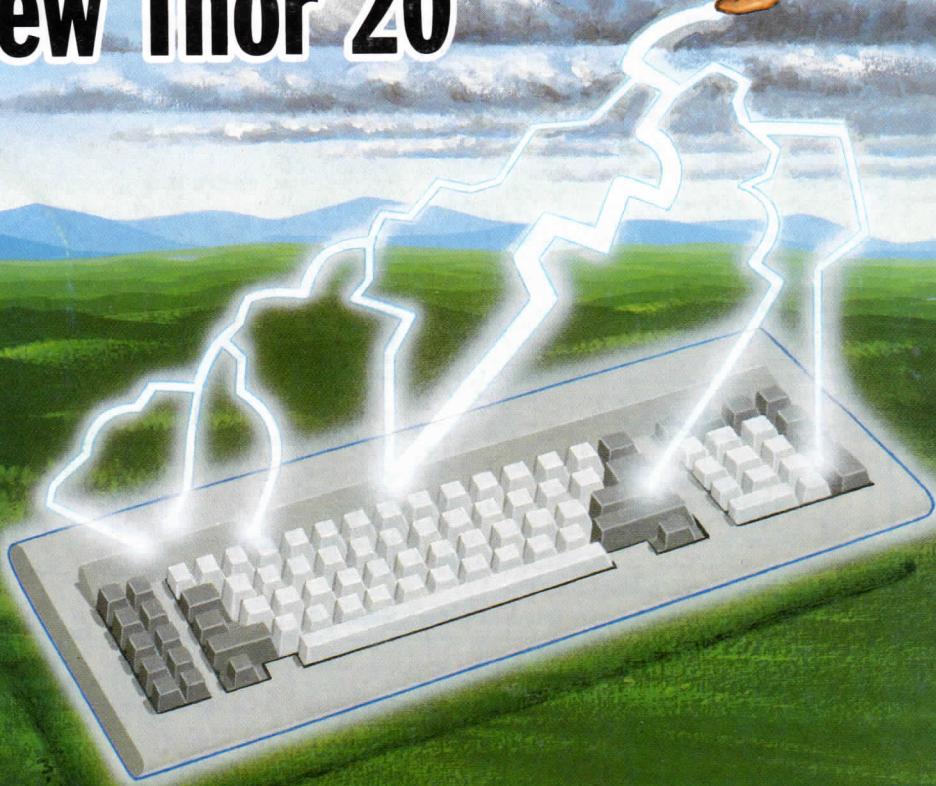
NETHERLANDS DFL 9.25

QL

WORLD

**FASTER THAN
LIGHTNING**

**Focus on the
new Thor 20**



Quill users
Spellbound

QL Agony
Column

MPC SOFTWARE

SOFTWARE

Leisure Software

BJ The Return	£10.00
Bridge Player	£12.00
Bridge Player II	£19.00
Chees	£17.00
Cuthbert in Space	£10.00
Eidersoft 3 pack	£15.00
Fictionary	£10.00
Flight	£17.00
Hopper	£9.00
Jabber	£9.00
Jungle Eddi	£13.50
Karate	£12.00
King	£10.00
Knight Flight	£14.00
Lands of Havoc	£10.00
Lost Pharaoh	£13.00
Matchpoint	£13.00
Meteor Storm	£10.00
Mr. Smith	£10.00
Othello 3D	£12.00
Oxford Trivia	£16.00
Quboids	£9.00
Scrabble	£13.50
Squadrons	£14.50
Startrek	£4.00

Utilities

Steve Davis Snooker	£13.00
Stoneraider II	£10.00
Strip Poker	£13.50
Super Croupier	£13.50
Tank Busters	£15.00
Trivia-QLUE	£20.0
Vroom	£13.50
Wanderer	£17.00

QFlash ROM	£23.00
QIMP	£33.00
QL Paint (Graphiq+)	£18.00
QL Peintre	£13.00
RAM Disc	£14.00
Shrink Program	£5.00
Sprite Designer	£8.00
Techniq	£45.00
Touch Typist	£11.00

Adventures

Aquanaut 471	£18.00
Dark Side of the Moon	£15.00
Mortville Manor	£17.00
Nemesis	£13.50
Nemesis + Music	£17.00
West	£13.50
Zkul	£13.50
Omega	£13.50
Omega (disk)	£15.00

Business

Cash Trader (mvd or diso)	£55.00
Concept 3D	£25.00
Concept 3D Demo	£2.00
Concept 3D & Viewpoint	£40.00
Decision Maker	£32.00

Entrepreneur	£34.00
Front Page	£21.00
PCB Designer 1	£90.00
PCB Designer 2	£90.00
Project Planner	£32.00
QSpell	£23.00
QSpell Disc	£27.00
Sideways	£18.00
Taskmaster	£23.00
Technikit	£24.00
Techniq	£45.00
Transact (Bookkeeping)	£27.00
Viewpoint	£17.00
Viewpoint Disc	£22.00

QL Trivia - QLUE

Here is a great new combination game!

If you liked QLUE and Trivia then this is for you.

Here is a combination of these two great games in one great package.

13 rooms - 13 weapons - 13 suspects

That's over 2000 possible outcomes!

Plus over 700 trivia questions covering every conceivable subject:

Religion - History - Science - Geography - Astronomy

Exceptional Value.....only £20

Due to bulk purchasing we are able to offer Concept 3D at the incredibly low price of £25 (saving £15 on the RRP), or Concept 3D and Viewpoint for only £40, saving £20.

PCB Designer

PCB Designer 1 & 2 now in stock at £90 each. Phone for more details or to get a demo copy.

BOOKS

QL Book of Games	£4.00
Sinclair QL Adventures	£2.50
Artificial Intelligence on the QL	£3.00
Maths on the QL	£3.50
Developing Applications on the Sinclair QL	£3.00
Simulation Techniques on the Sinclair QL	PHONE
Quill, Easel, Archive & Abacus on the QL	PHONE
Inside the Sinclair QL (Hardware)	£6.00
Desk-top Computing with the Sinclair QL	£3.00
Word Processing with the Sinclair QL	£3.00
Database Management on the Sinclair QL	£4.00
Advanced Programming with the Sinclair QL	£4.00
Making the Most of the Sinclair QL	£3.00
Using Graphics on the Sinclair QL	£7.95
Introduction to Superbasic on the Sinclair QL	£3.50
Introducing the Sinclair QL	£3.50
Profiting from the QL (Abacus)	£4.00
QL Computing	PHONE
QL Advanced User Guide (QDOS)	£15.00
Quantum Theory	£4.00
QL Quill	£4.50
QL Easel	£4.50
Sinclair QDOS Companion	£6.95
Assembly Language Programming on the QL	PHONE
QL Service Manual (circuit diagram etc.)	£19.95
Hackers Handbook	£4.00
Creating Adventure Programmes on your Computer	£2.50
How to Computerise Your Business Sucessfully	£2.50
QL Handbook	£5.95
QL Compendium	£5.95
Exploring Artificial Intelligence on the QL	£3.50
Abacus Users Reference Manual	£5.00
Computer Art & Graphics	£4.00
IBM PC Users Guide	£4.50
Xenix Users Handbook	£5.00
MS-DOS, an Introduction	£5.00

Sinclair QDOS Companion

The QDOS Companion, by Andrew Pennell, one of the most prolific authors on the QL, is essential reading if you are interested in programming the QL in Machine Code. It describes all the functions of QDOS, and gives details of all the TRAPS, and VECTORS calls. It includes details on how to access the keyboard, screen, serial ports etc. from machine code, how to communicate with the 8049 co-processor, and how to write multi-tasking programmes and lots more.£6.95

QL Service Manual

The QL Service Manual is the book issued by Sinclair Research to QL repair companies, and contains all you need to know about the QL Hardware. It has full circuit diagrams including the microdrives, details on various chips and their functions, block diagrams, fault finding and lots more£19.95

7 Book Pack

The following seven books from the Hutchinson QL range at less than a third of their original price (over £50).

Word Processing on the QL Profiting from the QL
Introduction to Superbasic on the QL Desk top computing on the QL
Database Management on the QL Making the Most of the QL
Advanced Programming on the QL

All 7 now only £16

Using Graphics on the QL

This book has been written with the intention of introducing both beginners and experienced programmers to ways of creating graphics on the QL. Topics covered include:

Using graphics with Easel Windows Graphics from SuperBASIC
3D Graphics, and lots more Only £7.95

HARDWARE

Peripherals

Centronics Printer Interface	£20.00
Serial Cable	£7.00
QL Computer & Software	£125.00
Repaired QL	PHONE
Video Digitizer	PHONE
Keyboard Membrane	£8.00
Eidersoft Mouse & ICE	£65.00
Microdrive Cartridges	£1.80
4 Microdrive Cartridges in Wallet	£7.50
Joystick Adaptor	£4.50
Microvitec 1451DQ3 Colour Monitor	£270.00
Miracle Modem	£49.00
Monitor Leads	PHONE
Schon Keyboard	£54.00
Talker	£75.00

Printers

Citizen 120D 120CPS draft, 25 CPS NLQ	£210
Citizen MSP20 200 CPS draft, 50 CPS NLQ	£450
Colour Printers & Laser Printers	PHONE
Ribbons £5 each.	
All printers come fitted with both friction & tractor feed.	
All printers have all the relevant interfaces and leads included, and carry a 2 year guarantee.	
Sample printouts available.	

Joysticks

Joystick Adaptor	£4.50
Elite	£13.00
Micro Ace	£15.00
Cheetah 125	£9.00
Pro Ace	£9.00
Pro 9000	£18.00
Professional Standard	£15.00
Wiz Card Joycard	£8.00

Postage:
UK: FREE on orders over £10.
£1 on orders under £10.
Europe: £1 plus £1 per book.
Outside Europe: Write.

All prices include postage & VAT

Also available a range of software & hardware for other 68000 machines (Amiga & ST).

Mail Order Address:

MPC Software
72 Julian Road,
West Bridgeford,
Nottingham NG2 5AN
Tel: 0602 820106

Personal callers come to:

The Nottingham 68000 Centre
40 Bridgeford Road,
West Bridgeford,
Nottingham NG2 6AP
Tel: 0602 455114

SINCLAIR

QL WORLD

Editor

Marcus Jeffery

Sub Editor

Harold Mayes MBE

Production Manager

Nick Fry

Designer

Chris Winch

Design Assistant

Neil Tookey

Art Editor

Jim McClure

Advertising Manager

Jane Brooks Wadham

Magazine Services

Sheila Baker

Anna Morrison

Managing Editor

Brendon Gore

Publisher

Paul Coster BSc

Financial Director

Brendan McGrath

Managing Director

Richard Hease

Microdrive Exchange 089 283 4783/2952 (2 lines) TIL

Sinclair QL World

Greencoat House

Francis Street

London SW1P 1DG

Telephone 01-834 1717

Fax 01-828 0270

Telex 941956 FOCUS G

ISSN 0268067X

Unfortunately, we are no longer able to answer enquiries made by telephone. If you have any comments or difficulties, please write to The Editor, Open Channel, Trouble Shooter, Technical Helpline or Psion Solutions. We will do our best to deal with your problem in the magazine, though we cannot guarantee individual replies.

Back issues are available from the publisher price £2 U.K. £2.75 Europe. Please telephone 089 283 4783 to check availability.

Published by Focus Magazines Ltd, London

Distributed by Quadrant Publishing Services, Sutton.

Subscription information from: TIL, PO Box 74, Paddock Wood, Tonbridge, Kent TN12 6DW.

(£15 U.K. £30 Europe. £45 rest of the world).

Typesetting by Jigsaw

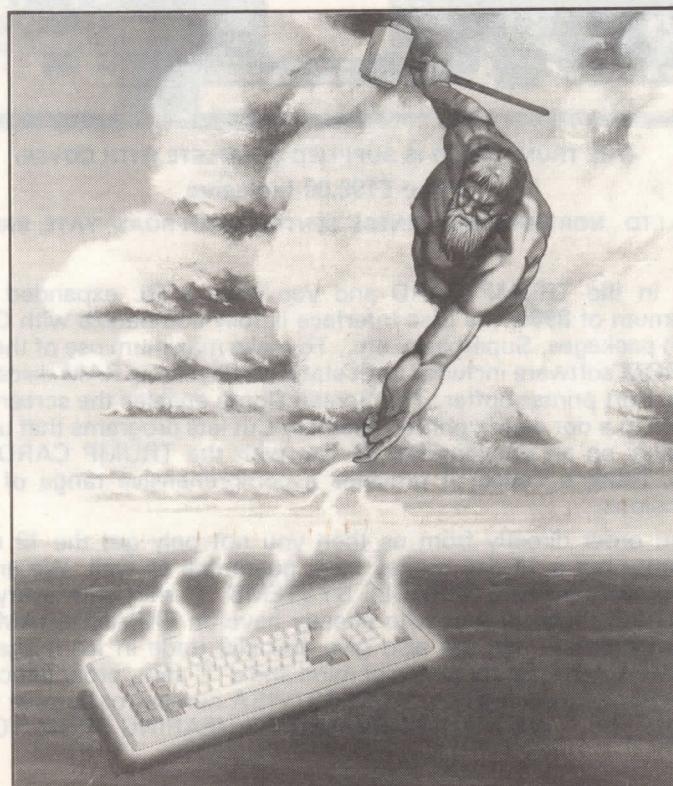
Printing by Benham & Co Ltd

©COPYRIGHT SINCLAIR
QL WORLD - 1987

CONTENTS

■ ■ JULY 1987

7	QL SCENE • All the news for the QL.
8	OPEN CHANNEL • The QL mailbag.
10	TROUBLE SHOOTER • Consumer problems.
12	THOR 20 • Thunderous applause or a weak jolt?
16	TALKING BACK • Our artificial intelligence application.
20	BETTER BASIC • On menu design.
23	EDUCATION • The last time?
27	SOFTWARE FILE • Adventurous tidings
28	UTILITY FILE • TechniQL plus Spellbound
34	PRINTER DUMPS • Graphic answers.
38	QL CONNEXIONS • More on the interface.
41	BOOKMARKS • Jottings on jottings.
42	TECHNICAL HELPLINE • Solving your problems.
44	PSION SOLUTIONS • Answering Psion problems.
46	THE PROGS • Video effects and more.
58	THE ALL NEW MICRODRIVE EXCHANGE • Look and see.



NEXT MONTH

Desk-top publishing

Digital Precision have recently launched their Desk Top Publisher, and Gap Software have produced an improved version of Front Page designed solely for expanded machines. Does the difference in price reflect the quality? We look at the facts next month.

Adventurous writings

The Quill adventure writing system has been available on the QL for quite a while, and is the basis of the latest adventure game. The Heart of Gern, reviewed this month. With the new release from Shadow Games of their APT Adventure Writer, we decided to compare these enterprising products.

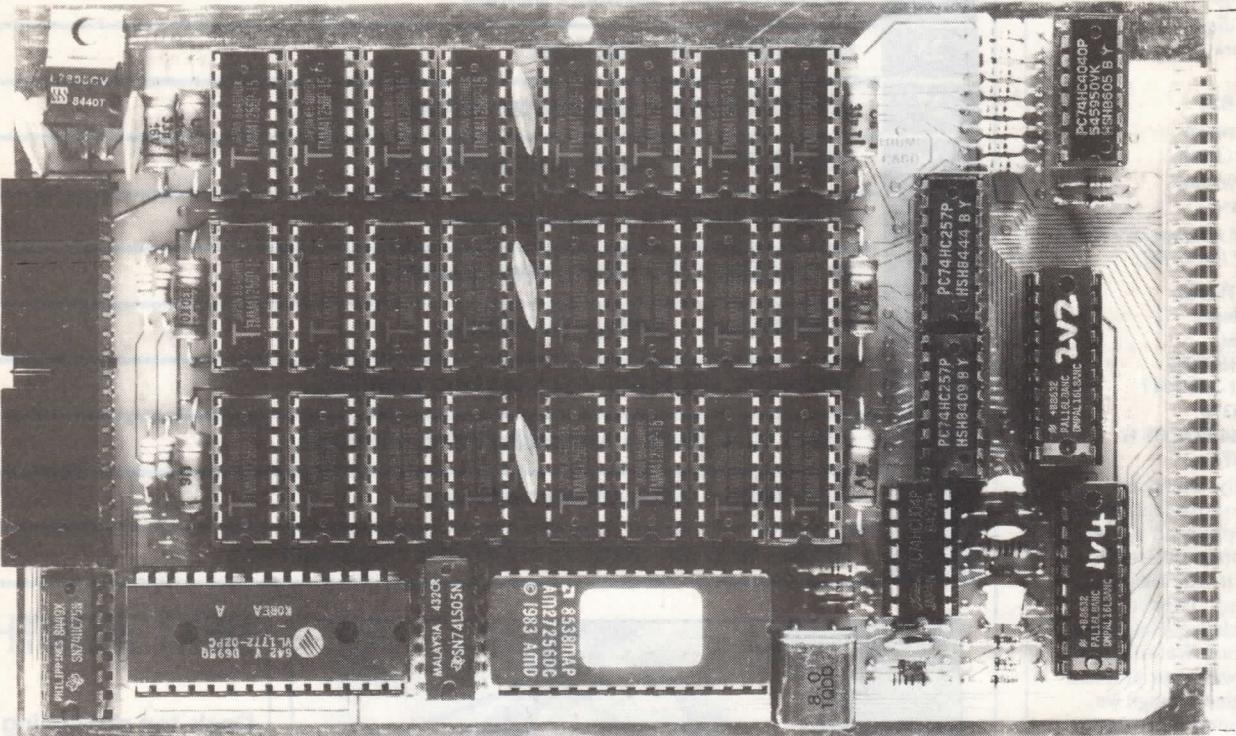
The roms

What is the real difference between an AH and a JS? How do you upgrade? Is it really worth it? You might be swapping known bugs in an early AH rom for unknown bugs in the later JS version. Next month, we take the lid off the QL.

MIRACLE SYSTEMS
Tel. (0454) 317772

TRUMP CARD

- 768K RAM making 896K total
- Disc Interface
- RAM Disc
- Printer Buffer
- Toolkit II
- Screen Dump
- Memory Cut



Ⓐ C143-012B-64S

⎓ 250V 04 87

(THE TRUMP CARD IS SUPPLIED COMPLETE WITH COVER)

Price £199.00 inclusive

MIRACLE SYSTEMS LTD., NORTHAVON BUSINESS CENTRE, DEAN ROAD, YATE, BRISTOL, BS17 5NH, U.K.

Plug in the TRUMP CARD and you have a QL expanded to its maximum of **896K**. Its Disc Interface is fully compatible with QDOS, Psion packages, Superbasic, etc., To make maximum use of the 896K the ROM software includes both static and dynamic RAM discs and a Serial Port printer buffer. The Screen Dump enables the screen to be copied to a dot matrix printer. Memory Cut lets programs that used to run only on an unexpanded QL run with the TRUMP CARD. And Tony Tebby's Toolkit II provides a comprehensive range of Basic extensions.

If you order directly from us then you not only get the 12 month warranty but a 14 day money back guarantee as well. We are also giving away a **FREE MIRACLE SYSTEMS 'T' shirt** with every retail order! For those of you who already have an EXPANDERAM 512K don't despair — we will also give you £50 trade in for it against a TRUMP CARD. So for peace of mind and a 'T' shirt, order direct from us by phone, quoting your ACCESS/VISA number or by post with a cheque, etc. WE LOOK FORWARD TO HEARING FROM YOU.

MIRACLE SYSTEMS LIMITED

14 day full money back guarantee on all products

12 month warranty on all products

All prices include VAT and P&P

QL MODEM £49

- ★ New printout software



- ★ 1200/75 e.g. PRETEL, T/GOLD
- ★ Autodial
- ★ 3 metre cable
- ★ Plugs into SER2
- ★ Includes Viewdata software
- ★ Includes 80 column software
- ★ Not BT approved

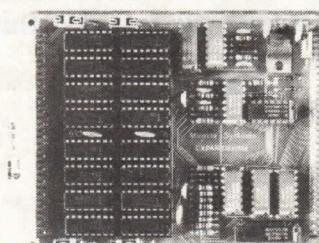
QL MODAPTOR £39

- ★ New printout software



- ★ Interfaces QL to standard modem
- ★ 300/300, 1200/75, 1200/1200
- ★ Autodial with DTR
- ★ Plugs into SER2
- ★ Terminated by 25 way D
- ★ Includes Viewdata software
- ★ Includes 80 column software

QL EXPANDERAM 512K £99



- ★ Increases QL memory to 640K
- ★ Through connector for i/f
- ★ Low power consumption
- ★ Can speed up some programs
- ★ Able to use larger Quill docs etc
- ★ Black cover included

QL CENTRONICS £19.50

PRINTER INTERFACE



- ★ Plugs into SER1 or SER2
- ★ Standard Centronics plug
- ★ Default baud rate 9600
- ★ 3 metre cable

QL QUADRAPRINT £19.50

- ★ 4 QL's to 1 printer
- ★ 5 metre cable £7.50
- ★ 10 metre cable £12.50
- ★ 20 metre cable £19.50

QL SERIAL CABLE £7.50

- ★ 25 way D plug
- ★ 3 metre cable

QL JOYSTICK ADAPTOR £4.99

- ★ Atari/Commodore J/S to QL

Tel: (0454) 317772

Orders welcome by telephone or post

MIRACLE SYSTEMS LTD., Northavon Business Centre, Dean Road, Yate, BRISTOL, BS17 5NH, U.K.

Please send me

Please find cheque enclosed to the value of £.....

or debit my credit card

Expiry date /

Signature

Send to: Name

Address

MIRACLE SYSTEMS LTD., Northavon Business Centre, Dean Road, Yate, BRISTOL, BS17 5NH, U.K.

**ATTENTION ALL QL ADVENTURERS! CAN YOU BECOME THE HERO OF THE 'PRINCELANDS'
IN THE ENTHRALLED NEW EPIC**

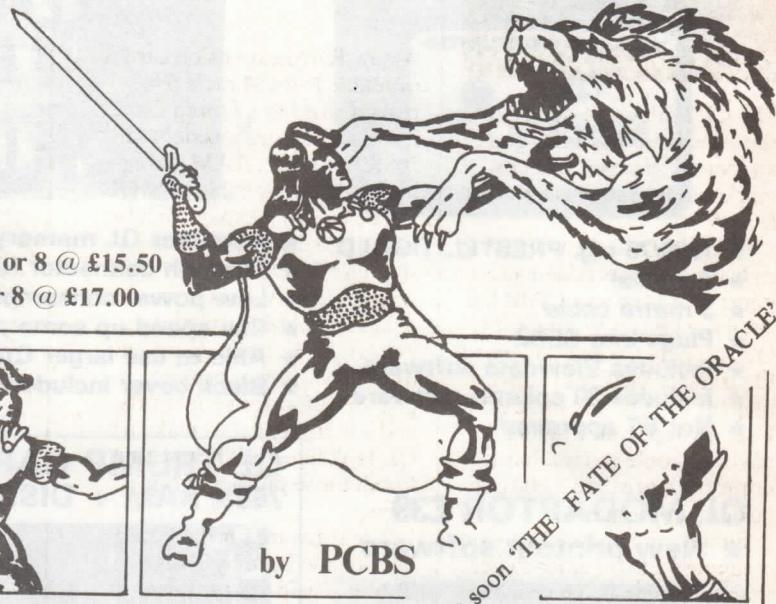
THE HEART OF GERN?

© 1987

The "Heart of Gern" is the first of a challenging series of adventure games devised to test even the most battle scarred adventurer. Set in the magical fantasy world of the 'Princelands' you Tirac must continue the quest for the black jewel which imprisons the evil spirit-wolf, Gern. You must reach the Heart before the brotherhood, an evil cult of wolf worshippers whose aim is to release Gern. Hidden

away in a secret vault protected by guards, traps and magical deceptions it will take more than luck to succeed, it will take skill, determination and above all rational thinking.

Will this be the dawn of a new dark age or can the evil brotherhood be thwarted? The fate of the 'Princelands' is in your hands.



Now available in four formats:- Microdrive Mode 4 or 8 @ £15.50
(Please specify format required) 3½" Disc Mode 4 or 8 @ £17.00



Send your cheques, P/O to: PCBS, Studio 204, Seedhill Offices, Paisley PA1 1JN. Please allow 28 days for delivery.

Micro AnviKa

220a Tottenham Court Road, London, W1P 9AF. Tel: (01) 636 2547

Kamla Electronics, 251 Tottenham Court Road, London, W1P 9AF. Tel: (01) 580 6382
Telex 94016414 ANVI. G (Quote 19010170) (24 hr Mail order)

Leisure

Wanderer (Pyramide)	£ 17.00
Othello (Pyramide)	£ 13.00
Vroom (Pyramide)	£ 13.00
Mortville Manor (Pyramide)	£ 17.00
Dragon Hole (Rubicon)	£ 14.00
Flight Simulator (MD)	£ 18.50
Karate (Eidersoft)	£ 13.00
Lost Pharaohs	£ 13.00
Jungle Eddi	£ 13.00
Nemesis	£ 13.00
Mr Smith	£ 13.00
Stone Raider	£ 18.00

Special Pack
Citadel/BJ 3D/Zapper
£14.95

Graphics

The Designer	£ 17.00
QL Peintre (Pyramide)	£ 13.00
Nucleon (Pyramide)	£ 17.00
Tasprint (Tasman)	£ 19.00
Tascopy (Tasman)	£ 14.00
Eye-Q (V2)	£ 29.00
Viewpoint (Rubicon)	£ 17.00
Sideways (Talent)	£ 18.00

Languages & Utilities

The Bags of tricks	£ 12.00
Digital Supercharge V1.18	£ 49.00
Digital Forth + Reversi	£ 26.00
Digital Editor	£ 24.00
Metacomco Latice C	£ 79.00

Metacomco APL	£ 85.00	Star NL10	£ 239.00
Metacomco Pascal New	£ 75.00	Epson LX86	£ 230.00
Metacomco Lisp	£ 51.00	Citizen 120D	£ 195.00
Metacomco BCPL	£ 51.00	Citizen LSP10	£ 219.00
Metacomco Assembler	£ 33.00	Miracle Centro I/Face	£ 19.00
Prospero Fortran 77	£ 95.00	Miracle 512K Expanderam	£ 98.00
Prospero Pascal	£ 95.00	Miracle Ram Disc Software	£ 12.00
Hisoft Devpac	£ 39.95	Miracle Q-code Modaptor Plus	£ 38.00
Talent Assembler Workbench	£ 24.00	Miracle 1200/75 Modem	£ 49.00
ICE	£ 26.00	Miracle WS2000 Modem	£ 99.00
Choice	£ 15.00	Miracle Systems QL Modem	£ 49.00
Icicle	£ 18.00	Cumana Disc Interface	£ 89.00
QSpell (Eidersoft)	£ 24.00	Cumana Dual 3½" Disc Drive including I/F	£ 289.00
Spellbound	£ 29.00	CST Disc interface	£ 79.95
Super Media Manager (DP)	£ 36.50	Dust Cover for QL	£ 4.95
Cartridge Doctor	£ 13.00	Cart (Hard) Storage Box	£ 4.95
Digital Professional Astrologer	£ 57.00	QL Membrane	£ 9.95
Task Master	£ 24.95	QL Transformer	£ 24.00
Front Page	£ 21.00		

Hardware

Miracle systems Trump card 760K Ram disc interface, Toolkit II and other features	£199.00
Including special offer: Miracle Systems Centronics Interface free of charge.	
QL Computer	£ P.O.A.
Philips CM 8833 new colour monitor	£285.00
T.V. tuner available for this monitor	£69.00
Philips CM 8533 Colour monitor	
Composite Video (phono)	
RGB to Linear input (SCART)	
RGB/RGB to TTL (for QL)	
plus many other features	
Philips BM7502 Mono Man	£275.00
Panasonic KX1081	£ 84.00
	£199.00

Psion Organiser

Psion Organiser CM	£ 99.50
Psion Organiser XP	£ 139.50
8K Datapak	£ 12.95
16K Datapak	£ 19.95
32K Datapak	£ 34.95
64K Datapak	£ 79.95
128K Datapak	£ 169.95
Finance Pack	£ 29.95
Maths Pack	£ 29.95
Spelling Checker	£ 29.95
RS232 I/F	£ 59.00
Link Up Adaptor	£ 12.95
Mains Adaptor	£ 12.95
Formatter	£ 44.95

We also stock other makes of computers, peripherals & software for

Amstrad, Atari, Commodore (Amiga) etc. . .

All prices are including VAT. Postage above £20 on software is free.
Please add 50p to order under £20. For computer, printers and monitors
please add £9.00 per item. Postal rates apply to UK only.

All goods subject to availability. Please phone for current stock availability.
Overseas orders are welcomed.
VISA AND ACCESS WELCOMED

E&OE



QL

CP/Mulator plus

The CP/Mulator reviewed in the June issue has undergone an identity change. It is now marketed by Sandy (U.K.) for £44.95.

In addition to the marketing rights, Sandy has added a few items. For instance, CP/M has been seen multi-tasking with Qdos. There is a new advanced file transfer facility to convert files for the QL and the CP/M User Group, which Sandy advises people to join, has a library of more than 7,000 public domain programs.

Finally, the updated version is supposed to be much faster than the original. The package includes an EPROM cartridge, a manual and a system disc or Microdrive cartridge.

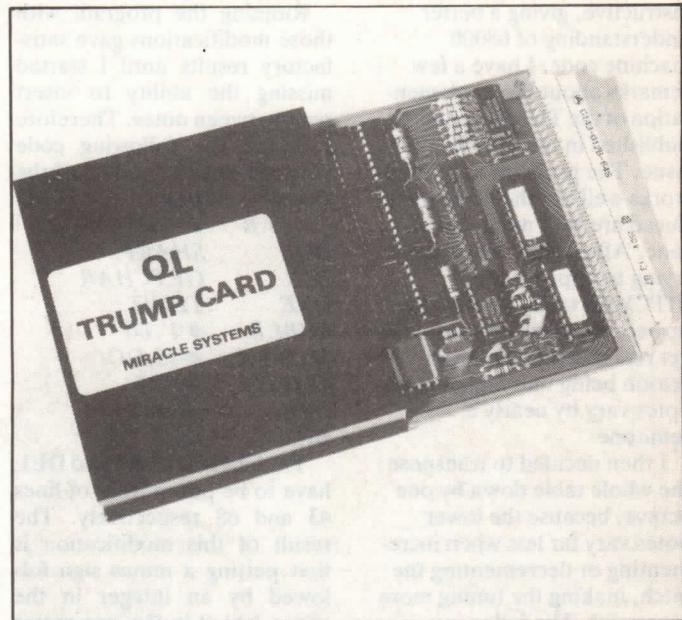
S C E N E

Coming up trumps

A new RAM expansion card is available from Miracle Systems. Called the Trump Card, it will add an unprecedented 768K to the QL RAM, bringing the total available to 896K.

The external expansion also includes a disc interface for standard 3.5in. double-sided, double-density discs, a static/dynamic RAMdisc facility, Toolkit II, a screen dump utility for a variety of printers, a printer buffer for serial ports, and a memory cut to make a QL look like a 128K machine for all those problem programs.

The software for the board has been written by Tony Tebby. The price for this expansion board is £199. We will look at the board in detail in a future issue.



Seiko Wrist Terminal for QL



The Seiko RC-1000 wristwatch terminal is available for the QL at £49.95. The watch is complete with QL software on Microdrive, an RS232 serial cable and two instruction manuals.

The idea of the RC-1000 is that it lets you create a set of data files on the QL and then download them to the watch for viewing on your wrist. Four types of information can be displayed — memo, yearly schedule, weekly schedule and world times. Each must be created using the software provided. Only the time, the date and a daily alarm can be set from the watch.

The RC-1000 is black with a

black metal strap and is about the size of an After Eight mint. That makes it bulky for those with thin wrists. The display is of the two-line LCD type with a maximum of 12 characters per line. Underneath there are six 'chiclet' buttons which control all the watch functions.

Like most digital watches, the RC 1000 gives a shrill peeping sound every hour and half-hour and a repeating peep whenever the alarm sounds. A tiny light lets you browse the time or data in the dark.

The memo function is the most useful of the four sections. It is where you store data like telephone numbers, lists of customers, important dates or events, notes and any information you feel you cannot do without. The software lets you organise data into files, each one identified by a label. Pressing one of the watch buttons lets you select a particular label and then you can scroll through the data stored in it.

The weekly schedule sets an alarm for a particular hour and day on a weekly basis. The alarm repeats at the same time

each week. A little less useful is the yearly schedule which works in the same way, albeit on an annual basis.

World time is aimed at the cosmopolitan globetrotter. It allows you to input a list of cities with the times relative to your own. The software makes it easier by letting you input a particular city time zone in relation to yours.

The software is menu-driven and fairly extensive. Any file can be edited and a comprehensive range of functions is offered, including search, delete, goto, erase, cut and paste. Completed files are then transmitted to the watch. Any data already in the watch will be erased and replaced by the new.

Because of the limited storage capacity, there is a trade-off between the four functions. The RC 1000 holds a maximum of 80 lines with 24 characters per line. If you create too large a file in one section you will lose capacity in the rest. Files can be stored on disc for expanding and amending at a later date. Any number of files can be created and stored in this way.

for transmitting to the watch when needed.

Although the watch is accompanied by comprehensive instruction booklets, the software manual tries to cover too many computers and may be a little confusing. Still, the Microdrive contains a Quill document which summarises commands implemented specially for the QL.

The RC-1000 is available by mail order only from Data-Skip, L Willemsteeg 10, 2801 WC Gouda, Netherlands.

QL Gold

There have been a few administrative problems with the QL Gold club. Our apologies to anyone who has suffered any delays in receiving the cards or microdrives.

There were also some problems with the first batch of microdrives. If you have a faulty microdrive please return it to: TIL, PO Box 74, Tonbridge TN12 6DW, remembering to quote your Gold Card identity number.

Open Channel is where you have the opportunity to voice your opinions in *Sinclair QL World*. Whether you want to ask for help with a technical problem, provide somebody with the answer, or just sound off about something which bothers you, write to: Open Channel, Sinclair QL World, Greencoat House, Francis Street, London SW1P 1DG.

OPEN

Better pitch

I am very pleased with the DIY Toolkit series, as it is very instructive, giving a better understanding of 68000 machine code. I have a few remarks about the implementation of the TUNE command, published in the March, 1987 issue. The program as printed works well but the notes produced are very much out of tune. After many hours spent trying to improve the PITCHES table, I had to give up because it was impossible to get real music from it, the reason being that higher pitch notes vary by nearly a semitone.

I then decided to transpose the whole table down by one octave, because the lower notes vary far less when incrementing or decrementing the pitch, making the tuning more successful. The following PITCHES table gives a fairly well-tempered two octaves:

PITCHES	DC.B 96,91,85,80,75	A,#A,B,B,C,#C
	DC.B 70,66,62,62,58,55,51,48	D,#D,E,E,F,#F,G,#G
	DC.B 44,41,39,39,36,34	a,#a,b,b,c,#c
	DC.B 31,29,27,27,25,23,21,20	d,#d,e,e,f,#f,g,#g

I also noticed that the values #27 and #8 in lines 55 and 62 have to be changed to #28 and

#9 respectively to allow for the existence of #g and duration 9.

Running the program with those modifications gave satisfactory results until I started missing the ability to insert rests between notes. Therefore I added the following code between lines 42 and 43 of the assembler listing:

```
CMPI.B #'-,DI
BNE SHARP
BSR GETCHAR
BNE TEXIT
SUBI.B #'1,DI
MOVE.L #-15,DO
CMPI.B #9,DI
BPL EXIT
BRA.S DEL
```

The labels SHARP and DEL have to be put in front of lines 43 and 68 respectively. The result of this modification is that putting a minus sign followed by an integer in the range 1 to 9 in the parameter string produces a rest for the specified period.

Brother bother

Your parameters for the Brother HR-5 printer, as printed in the February, 1987 issue, are incorrect. I have had problems using the underline mode in Quill. Once turned on it underlines the rest of the document. To solve the problem, enter the codes in decimal in the INSTALL BAS program. Also TRANSLATE 1 will not work. It is possible to switch character sets only using the DIP switches SW-1-7 and SW-1-8.

An alternative list of parameters may be useful. The Translate commands included enable reduced and enlarged characters to be printed in the Quill document.

Driver name: HR-5
 Port: SERI
 Baud rate: 9600
 Parity: NONE
 Line/page 66
 Characters/line 80
 Continuous/
 forms: OPTIONAL
 End-of-line code: CR,LF
 Preamble code: NONE
 Postamble code: NONE
 Bold on: 27,69
 Bold off: 27,70
 Underline on: 27,45,1
 Underline off: 27,45,0
 Subscript on: 27,83,1
 Subscript off: 27,84
 Superscript on: 27,83,0
 Superscript off: 27,84

Translate 1: 'CTRL SHIFT L,27,87,1
 Translate 2: 'CTRL SHIFT O,27,87,0
 Translate 3: 'CTRL SHIFT R,15
 Translate 4: 'CTRL SHIFT C,18

TRANSLATE 1 and 2 turn double-width enlarged characters on and off. TRANSLATE 3 and 4 turn reduced characters on and off.

Jeff Bishop,
 Gillingham, Kent.

Contour plotter

I was impressed and informed by Dr Dormand's contour plotting program in the April, 1987 issue. After several runs I would like to add two comments. First, it seems to prefer an odd number of "Y" points. Second, the gprint prt routine, although efficient, introduces a slight distortion, at least on my Brother HR-5.

Both can be settled by entering 129 points for X, from -1.1 to 1.1, and 23 points for Y, from -1.33 to 1.33. A circle of radius one is then almost undistorted.

C R Oswin,
 Christchurch,
 Dorset.

Take off

In response to the Grounded letter in the April, 1987 Open Channel, I thought you might be interested in the following. I am an aeronautical engineer and I have been working on a *Flight Simulator* for the QL in my spare time for almost a year. I have been concentrating on writing a 100 percent, machine code routine for producing three-dimensional perspective views from the cockpit. This is now complete and I am working on the instrumentation and flying characteristics. I hope the program will be ready by the end of the year.

It will include filled 3D perspective views of the land and sky, an accurate database of at least 20 U.K. aerodromes and 100 navigation beacons and variable winds, weather, visibility, emergencies, and so on.

The program has been written in a modular format, enabling the inclusion of a feature to change the aircraft type. For example, you can train on a light single, progress to a twin, try your hand at an executive jet, then move to tackle an airliner, possibly gaining experience on helicopters and military jets along the way.

Bernard Denchfield,
 Bristol.

Canon correction

I am writing concerning the use of the Canon Typestar 5R mentioned in the October, 1986 issue of Open Channel, and the problem with the pound sign. The ASCII table on page 34 of the Canon handbook does not include this symbol but the local character table on page 35 does. Therefore, before going on-line, set the protocol character code to 'LOCAL' instead of the usual ASCII code, and the pound sign will be printed instead of the hash symbol.

I had the same problem with the connections of the serial lead but eventually sorted out that the blue wire should be shifted from pin 20 on the 25-pin plug to pin 4 for SER1 working.

Ken Lynas, Middlesbrough.

Adventurous objectives

In the May edition of Open Channel, Chris Hopkin wrote asking for a section in the magazine devoted to adventures. He, and I suspect many others, will be pleased to hear that I am preparing to start a magazine entitled *QL Adventures Forum*.

At present I am trying to assess the likely market. Obviously the more feedback I get, the more likely it is the magazine will prosper. It will be at least three months before the first issue appears and I would welcome all letters of support.

Richard Alexander,
 Cwm Gwen Hall,
 Pencader, Dyfed, Cymru SA39
 9HA.

CHANNEL

Super SuperBasic

I am a late starter to the QL. Just when I had bought the machine, the Finnish agent stopped representing the QL. I have managed to find only two books on the machine, both of which are too primitive and often inaccurate. Could you please recommend a book showing advanced SuperBasic without resorting to machine code?

Timo Mikonmaki,
Finland.

Editor's reply. There are a number of books which purport to teach advanced SuperBasic but they are rarely useful in teaching how to write advanced programs. Instead they deal with a few commands and show a few applications. If you watch our Better Basic section you should

see the kind of thing for which you are looking. We are to deal with program structure, design, advanced data structures and so on.

Super service

Recently I bought the QL *Small Traders* pack from SD Microsystems of Hitchin, believing that my Mannesman Tally MT80 printer was sufficiently compatible to run the software. It proved to be almost true, except for a problem with spacing.

I decided to contact SD Microsystems and Mannesman Tally. I took a sample of the poor spacing to Mannesman Tally which then lent me a later model of its printer which has a built-in diagnostic ability, asking me to run the software using the diagnostic routine

and send the resulting printout. I would add that the company not only let me have a very expensive piece of equipment but changed the interface to serial for me.

On receiving my letter, SD Microsystems telephoned to say it was concerned with my problem, had examined my printouts, modified one of the programs contained in the "pack" and posted it to me. I was asked to run it and if it solved the problem, return my original together with the modified cartridge and the whole pack would be modified to suit my printer. That was done.

I did not need to bother Mannesman Tally again but it would have attempted to alter the printer to accept the control codes it was receiving. Absolutely first class service.

Finally, something which

may be of interest to others. I produce a six-page duplicated price list twice a year. Quill obviously plays its part but I wanted to avoid the chore of typing stencils. My enquiries met with blank stares or firm assurances that it could not be done with a dot matrix printer.

Logic suggested that if the printer could produce an original and two carbon copies there should be sufficient impact to cut stencils. I have altered the printer driver to accept double strike and by removing the printer ribbon and using very fine membrane 'printwheel' stencils the result is acceptable. Admittedly it is not so good as a daisywheel or golfball but very much faster and easier.

Stanley Sach,
Beech Hill,
Berkshire.

Pro Pascal and Pro Fortran-77

FOR SINCLAIR QL: £99.95 incl VAT

USE THE LANGUAGES THE PROFESSIONALS USE: PASCAL AND FORTRAN.

Pascal is excellent for education and for long-term projects. Fortran gives you access to hundreds of existing programs – and uses established programming skills!

ISO-PASCAL

Pro Pascal is validated to ISO 7185 / ANSI 770X3.97 Class A (no errors) on the Z80 processor under CP/M and the 8088 processor under PC-DOS. This provides a guarantee that the compiler is complete and works perfectly.

FORTRAN-77

Pro Fortran-77 is a fully validated implementation of ANSI Fortran-77 with no omissions and many useful extensions.

Pascal ↔ Fortran

Interlinkable code means you can use the best of both languages. Ask for details.

Hand-coded library

Produces compact and efficient programs.

16 digit accuracy

Single and double precision IEEE format arithmetic gives 7 or 16 digit precision.

Ideal for

- software developers
- universities and colleges
- government and industry
- students of computing
- development of personal skills
- solving technical problems
- training institutions

50,000 Lines Big

Compiles big programs >50,000 lines...>5,000 identifiers...Separate compilation to build libraries and massive program suites.

Compilers include

- compiler
- linker
- run-time libraries
- librarian
- X-ref program
- sample programs
- 200+ page manual
- graphic subroutines

Quote: "Pro Pascal is not only ISO-validated, it is also a superb-quality and very full software development tool." Personal Computer World Nov 1985

It's easy to order!

Credit card holders phone 01-741 8531. Mastercard, Visa, Diners & Amex accepted. Prospero's compilers are also available from good software dealers and distributors worldwide.

Reviews & Info

Call 01-741 8531 or write in for a free info pack with datasheets and magazine reviews.

Mail order service

Send this coupon with cheque to Prospero Software Ltd, 190 Castelnau, London SW13 9DH, England. Add 15% VAT in UK or £3 shipping outside UK.

Please supply (enter number required):

____ Pro Fortran-77 for Sinclair QL at £86.91

____ Pro Pascal for Sinclair QL at £86.91.

I enclose payment of £ _____

Name _____

Address _____

Country _____

Telephone No. _____

In case of query call 01-741 8531 or telex 8814396. Tick product name if you just require information!

QLW 6/87

Prospero Software

LANGUAGES FOR MICROCOMPUTER PROFESSIONALS

190 CASTELNAU, LONDON SW13 9DH, ENGLAND TEL 01-741 8531 TELEX 8814396

T



ROUBLE

A

P

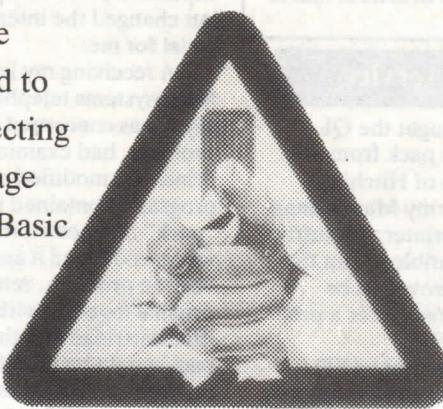
R

O

B

L

Bryan Davies looks at more common problems designed to baffle and infuriate unsuspecting QL users. This month voltage spikes and compiled SuperBasic programs get the Troubleshooter treatment.



A friend of mine raised two points which must apply to other readers. The first concerns something which can happen to any QL — lock-up. If operation of domestic lights or appliances causes flashes on the screen, voltage spikes are occurring which may be big enough to shut down the system and something should be done to get rid of them.

Do not believe that just fitting suppressor plugs or adapters will cure the problem; it might but it is possible that it will only reduce the frequency of lock-ups. The cheapest device, and possibly the most effective, is the Varistor — variable resistor; fit one to every 13A plug connected to an appliance which may be causing trouble, e.g., refrigerator, freezer, vacuum cleaner.

Fit them to the system unit plugs also. Fluorescent lights can cause spikes and it may be necessary to open them to fit a Varistor internally, between live and neutral. Further distress, in the form of chip failure, can be avoided by adopting a set procedure for switching on. Your printer manual will probably advise you to power on and off in this order — printer, other devices, e.g., disc drives, computer — to avoid spikes produced by the relatively high start-up and power-down current drawn by the printer affecting the QL chips.

As all my system units are connected to the same four-way adapter, I switch everything on and off together from one switch and have not noticed any trouble resulting from this procedure in two-and-a-half years. What is certain is that

switching printer or disc drives on and off while the QL is on is bad practice.

The second point concerns compilation of SuperBasic programs, using *Supercharge* or *Turbo Supercharge*. You do not have to use the compiler for long to realise just how badly-written many SB programmes are; the compiler will produce a bunch of warning and error reports on many programs. The warnings will often be mainly about failure to dimension variables and it is possible to leave the compiler to give default dimensions but this may not be satisfactory if the program is large and requires many DIM statements.

Default size

The default size allocated may be larger than necessary in many cases; if so, it is desirable to add the appropriate DIM statements to the SB program. The word "ambiguous" can appear regularly in error messages from the compiler and it will often be caused by the use of a "familiar" string of characters — familiar to the QL, that is — or by using the same string for two purposes. An example is referring to a string variable as STRING\$ or LEN\$; if you have seen a string of characters used in the Keywords section of the User Guide, do not use a similar string to identify a variable or procedure in your program.

If, you are not clear about what the words assemble, interpret, compile and so on mean, you may be baffled by the running battle between the producers of *QLiberator* and *Supercharge/Turbo Supercharge*. On the basis that any noise is better for business than no

noise at all, the effort expended on this subject may well have been repaid in sales revenue. It might be worth repeating a few points as a guide to the would-be purchaser.

The word compile, when used in the computer world, has a more specific meaning than when used in daily life. In the case of the QL, compiled code can be run directly by the 68008 main processing chip. Both forms of *Supercharge* produce such code. It is possible to produce an intermediate form of code which is not interpreted and run line-by-line at run-time, as *SuperBasic* is, but nevertheless is not run directly by the 68008.

Slower code

QLiberator produces such code. The need to pass through an intermediate stage inevitably makes the code produced by *QLiberator* run slower than that from *Supercharge* or *Turbo*. There is the more general aspect of the word compile to consider — a program which is called a compiler should be able to take programs written in *SuperBasic* and produce code which will run much faster than the original SB code. The three programs on the market differ somewhat in their willingness to convert SB programs to faster-running code.

QLiberator is more agreeable to accepting badly-written SB, whereas *Supercharge* objects strenuously to it. *Turbo* is somewhere in between, because effectively it can re-write some bad SB and then compile it. There is still debate about just what the rules of *SuperBasic* are and it can be argued that none of the three programs is completely compatible with SB. You may have to do some re-writing of your original code for all of them before being able to produce fast-running code which also runs as the original did.

Certain choices seem obvious; if you cannot, or will not, write good SB, *QLiberator* is your best bet. If you can write good code and want the maximum speed of running, *Supercharge* or *Turbo* are the ones, the latter being much the better. The latest version of *Turbo*, compatible with *QRam*, is 1.14; compatible versions of *Editor* are 1.17/1.18.

What happened to Technology Research, the company which sold the Delta interface? Can anyone supply its current address and telephone

SHOOTER

E M S O L V E D

number? The reason for asking is a problem which occurs using two Delta 128K interfaces. One had the version 1.12 EPROM, the other had 1.14. It was decided to have a copy made of the 1.14 chip, since TR could not be contacted to obtain another one. It was done but the QL to which the updated interface was attached soon developed a problem — the start-up screen would not come up reliably and, eventually, there was no screen picture.

The symptom is a sign of a defective 8301 chip, next to the main processor, according to the QL Service Manual; sure enough, five minutes later, the QL was working well again, with a new 8301 fitted. In the meantime, a second QL was being used with the other interface but that one developed the same symptoms.

Investigation revealed that the 8301 had failed in that also. The interface in this case had the original 1.14 chip, not a copy. Both QLs had worked well without the interfaces but had failed shortly after they were fitted. There was also a test with a third QL, which worked well for hours with the copy 1.14 chip, then started giving screen problems; with the 1.12 chip fitted, all was well again.

Same combination

Refitting the 1.14 chip with the legs cleaned seemed to solve the problem but it was that same interface/chip combination which was fitted when the second QL malfunctioned. The implication appears to be that there is something wrong with both 1.14 chips which might be explained by saying the copy was not a good one but the original was as bought, unless something had been done to it while the copy was being taken from it.

An interesting sidelight on this episode was the variation in performance of the QLs with different 8301 chips fitted; the flashing speed of the cursor was frenetic with the replacement chip but a benchmark memory speed check showed one repaired QL to be appreciably slower than another which had not been touched — 46 seconds against 32.

The original reason for changing to the 1.14 EPROM was that NEC disc drives appeared not to work with the 1.12; on checking the 1.12 with Mit-

subish drives they worked, and that is because neither manufacturer seems to stick fully to its own specification. Like it or not, you have to think of such considerations when buying add-on units; always try to test such units with your system configuration before buying them.

Responses

E G Dawson has offered to copy version 1.01 of the Quest disc operating system program for I J Bottomley — address details have been sent direct.

J R Dufton reports that 4 Systems did not deliver items ordered, despite accepting payment for them, but he has now succeeded in getting the money back from Access. If an order has a value more than £100, payment by credit card can give some protection against default by the supplier and it is a much safer way of paying than by cheque or postal order. On a more cheerful note, Dufton says that he has had "excellent service" from Tandata, TK Computerware, Zitasoft, Gap Software, Miracle Systems and Digitrix.

I Lewis has been having difficulties running and backing-up three programs. As problems occurred with several program cartridges and discs, it is likely that there is something wrong with his system, or that he is not following the instructions properly. Regarding the system, Digital Precision commented that no memory expansion is fitted but disc drives and Toolkit and front-end software are in use; the memory space required by the three programs QSpell, Editor and Professional Astrologer, is unlikely to be available with such a configuration. All the programs have been on sale for many months and work correctly on systems with sufficient memory available; the number of copies sold is in the thousands, so there cannot be serious problems in the software. In that case, the thing to do is buy a memory expansion module, preferably 256K or more.

Chromagraphica has not responded to a request for information on a monitor ordered by reader H M Mortenson of Angered, Sweden. If anyone knows the current address of the company, please let me have it. The same reader asked about availability of the Dutch Velotype keyboard; does anyone know of such a

keyboard which is suitable for the QL?

J Pemberton-Bates has an MCS 512K external memory/interface PCB, together with a basic Toolkit and utilities, which worked until he had a Sandy Q-XT640 keyboard and disc drive kit fitted. He now finds that he cannot use the MCS utilities, nor Talent programs, although Psion programs work. Do any readers have experience of this problem and can they offer any solution?

H E Milton asked why he had not received the newsletters and free copies of *QL World* offered when joining the Psion Support Scheme. As I expected, Psion's answer was that the scheme it ran did not include free offers and it suggests Milton has confused the Sinclair scheme with its own. The Sinclair offer ceased with the company when the QL rights were sold to Amstrad. Psion continued to provide support but only if members paid a yearly fee.

Postage

Two pieces of advice from a supplier when returning goods — ensure they are packed well and send them by registered post or recorded delivery. Some items are packed so badly that they arrive smashed and nothing can be done to check the customer's complaint about their operation; others apparently never arrive at all. While it is believable that a few items are lost in the post, it is really not an acceptable explanation for non-arrival of returned goods. The Post Office is often blamed far too much for what goes wrong. Suppliers become rather cynical about such explanations; they feel that such items are more likely to have been incorrectly addressed, packed so badly that the address becomes unreadable, or even not sent at all.

In the same vein, it is suggested that some items returned for refund, because they do not work, have been returned because the purchaser decided he did not really want that particular item and was not prepared to say so, or, worse still, after a copy has been made of an unprotected program. Unfair comment? Applied to the majority of purchasers, it would be unfair but suppliers have to deal with all types and there are bound to be some who "try it on".

I Under th

Before even starting such an article about the Thor 20 and who will buy it, it is obvious that there will be readers who will feel their particular interests have not been dealt with. There is such a wide range of QL types — the commercial program writer, the scientist, a variety of authors, the local vicar. To try to cover the points which will be important to the kind of person expected to buy the new Thor, I asked David Oliver of Cambridge Systems Technology, whose baby the machine is, whom he sees as buyers. The answer was "existing Thor customers — technical users, such as the BBC, 68000-software developers, business/office users". There is no reason for the Thor 20 not to be used in a normal office environment, provided the software to be used does not have to be PC-compatible.

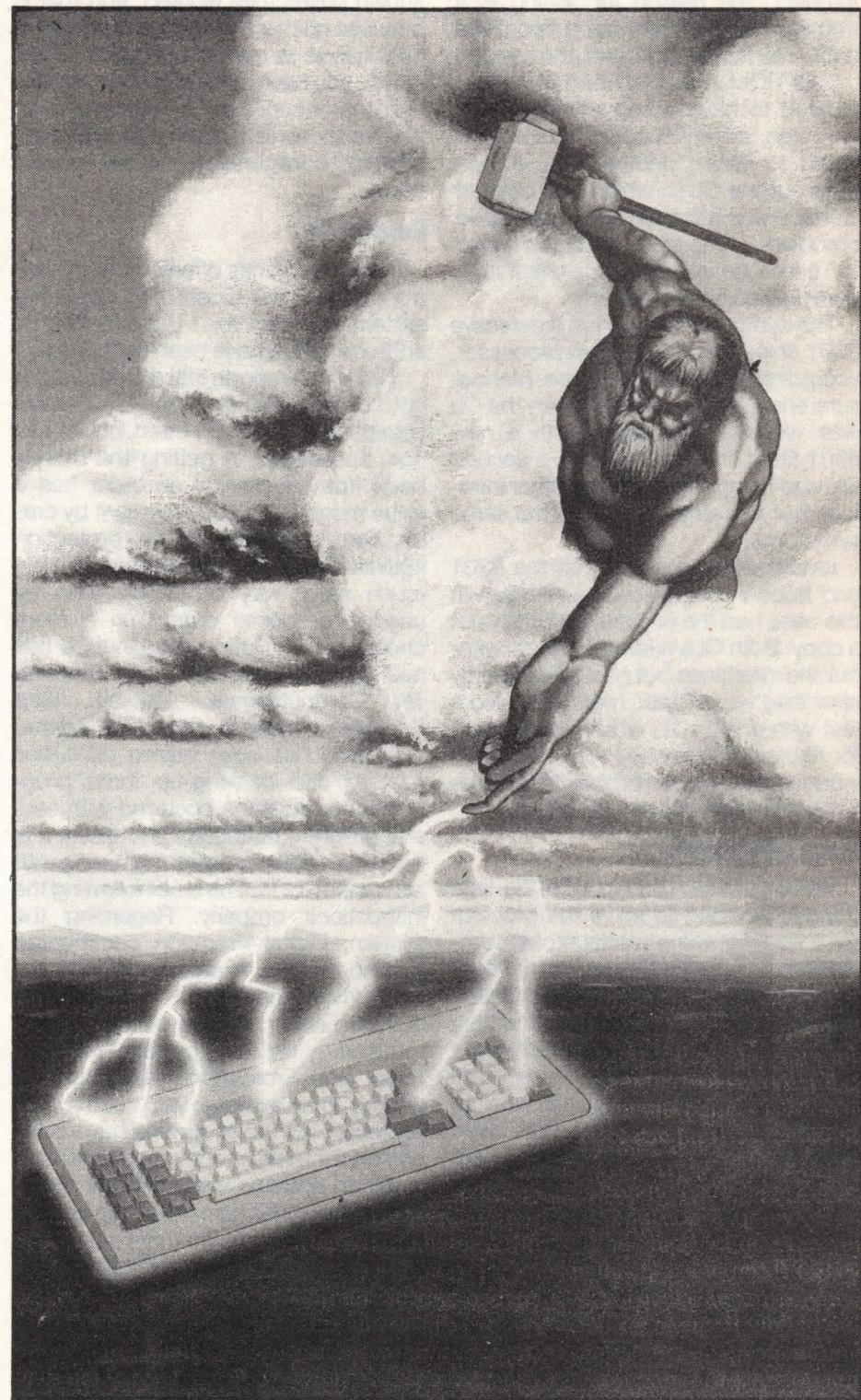
Certainly the price range makes the Thor an attractive proposition when compared to current IBM machines or to some of the compatibles; from a performance standpoint, the Thor 20 must be compared to the new generation of 386-chip machines and it is at the lower end of their price range.

For the software developer, the attraction is perhaps more obvious. The QL is a useful tool for those writing programs for other 68000 computers and some authors have already upgraded to the Thor 1 models, so the step to the Thor 20 is a logical progression. It is a more powerful machine, at a price which is well below the obvious competition — the Motorola VME series at, typically, £5,000.

Performance

The Thor 1 uses the same PCB as the QL but it operates rather better than the QL, without providing a sensational performance improvement. It is packaged better, has a more-useful form of the Psion quartet, employs a conventional keyboard, and offers a hard disc. More than 300 have been sold — not a great number by Amstrad standards but CST aims to sell what it can reasonably produce and support and makes no grandiose claims. If it sells as many of the Thor 20, it will feel it is successful.

It is, however, in a position to produce



considerably more and will be extending distribution to increase the penetration of the market. The price range for the new machine was roughly £1,200—£2,300 including VAT until the end of June; about £100 more after then. You

have to provide your own monitor and printer. That is a big step up from current QL prices but anyone employing the computer for business purposes should give it serious consideration because of its performance. The price range quoted

e hammer

is for the 12.5MHz versions, identified as Thor 20 without the floating point co-processor, and Thor 21 with the FPC; the 16.7MHz Thor 20/21-16 with the 68030 chip is likely to be around £500-£700 dearer and can be produced now if there is the demand for it. There are still some small problems with the FPC function to be sorted out but delivery of the first Thor was expected early in June.

How fast? is a question deserving of criticism, because there is no single, simple yardstick for measuring speed but it is necessary to give a guide to the improvement and the benchmark values in table one are provided for the purpose. It is reasonable to say that the Thor 20 is several times as fast as the QL on specific tasks. The RECOL command operates about four to five times faster.

Upgrades

While the Thor 20 cannot be a full 32-bit machine, because the 8-bit QL is still an integral part of it, it is a big step in that direction and it is intended that there will be full 32-bit versions at a later point in the development cycle. By that time the QL PCB will no longer be part of the machine but it will have served its purpose well. The 32-bit machines will have cache memory for both instructions and data.

The existing Thor 1 is the basis for the Thor 20 and the QL is the basis for the Thor 1. You have, therefore, a QL PCB, packaged in the familiar Thor casing with a RAM expansion board below it, a small board containing the 68020 chip and its associated components piggy-backed above the QL 68008 chip, and another small board containing EPROMs. In addition, two ROMs are changed in the Thor 1.

Existing Thor owners can have their machines upgraded to Thor 20s. The clock speed will be 12.5MHz at present; 16.7MHz is being offered but it is expected to be of interest only to those who need extensive calculation in their programs. The relationship between the 68008 of the QL board and the 68020 of the new board is too close to say that they are independent processors linked just by a data bus but the 68008 will restrict data transfer between them to 8-

bit mode.

It is not true, however, that this factor prevents the computer operating faster than the QL. The processing will be much faster, aided by the 68020 cache-memory feature, which enables instructions which have been processed recently to be executed faster subsequently. The screen-handling is much faster, too, if you have seen the swinging pendulum demonstration on the Thor 1 at Microfairs, you could not fail to notice that the leisurely pendulum now moves like a windscreens wiper on the Thor 20. Yes, even Quill looks fast.

The price range quoted allows for the optional maths co-processor chip, the MC 68881. It adds about £200 to the basic price and will be worthwhile where extensive calculation work is done. Complaints are sometimes voiced about the limited precision of the QL floating-point arithmetic, which is nine digits although only seven are printed, but that is better than some other forms of Basic. The full nine digits can be had by compiling SB programs with *Turbo Supercharge* and it is expected that the program will run on the Thor 20.

Scientific users have an obvious need for precision but there are more everyday requirements, such as simple money calculations in countries like Italy — current exchange range about 2,100 lire to £1, that is £1 million is about 2×10^9 lire. There are already some reasonable CAD programs available for the QL and enhanced forms can be expected for the Thor 20. To make the most of the speed improvement gained by using the FPC, programs need to be re-written and compiled.

Disc drives

One or two 720K 3½in. disc drives can be built-in or one 720K disc drive and one 20MB hard disc drive. It is planned to offer a dual drive unit in the present single slot and a 40MB hard disc. An 84-key IBM AT-style keyboard is connected by flexible cable. Keyboards can be provided for the U.K., Denmark, Germany, France, Sweden and Greece; Italy, Spain, Iceland, Turkey and the Soviet Union — Cyrillic — will be catered for later. Although different ROMs have to be fitted to give the national error messages, selection of the character

sets is controlled by software — the one basic keyboard allows selection of the different languages, although the key caps obviously have to be changed to match.

As the keyboard is the same as used on IBM systems it provides functions such as Cursor-to-End-of-Line and Delete as single-key operations; there is a numeric pad with the cursor keys included in it. One detail feature I like is the key on the right of the pad which allows you to select either the hyphen or underscore, depending on what work you are doing; it means that I could avoid my persistent problem of keying the hyphen when needing the underscore for device and file names in SuperBasic.

SuperBasic, in the form of the interpreter, is still there; it is part of the QL PCB. It means that existing QL software can be run but that is not a blanket claim for all programs; there will be some programs which will not run or will need modification to run, and only those written for the JS or MG ROMs are fully-supported.

Compatibility

Programs which run on Thor 1 will run on Thor 20. The operating system is still Qdos, with the bugs bypassed, and with the enhancement of the 68020 features; "last-line recall" is incorporated, as are the Tebby Toolkit networking commands. Other Toolkit commands are included but mainly those which are needed by business users rather than the more technical ones.

The screen resolution is the same as for the QL. A switch-mode power supply is installed; this type of supply is much less prone to passing-on mains voltage spikes than the type used with the QL, which permits so many lock-ups. The ports are the same as on the Thor 1 and use the same connectors. A Microdrive unit can be connected by means of a cable which is fed through one of the slots at the rear of the casing. It permits protected software to be run with the master cartridge in Microdrive 1.

Additional, external floppy and hard disc drives can be added, connected to a standard 64-pin expansion connector. A mouse is an extra-cost, plug-in fitting. Serial and parallel printers can be



connected and there is a 32K buffer for the latter; a spooler is provided for ASCII files. The Q-488 instrument interface and QEP-III EPROM programmer can be connected. Such interfaces as the Midi for music will no doubt be introduced by other companies — Oliver says he is not sufficiently knowledgeable about music to handle this project. The Ice front-end is provided but on disc instead of ROM and not very different from the current product; it is anticipated that the desk-top features will eventually be part of the operating system and be more in line with current competitive offerings.

RAM is only 640K, with no present plan for expansion. The reasoning is that 640K is sufficient if the programs using it are not wasteful of space, as the QL versions of the Psion programs are but Xchange is not. In addition, the reasons for using RAM to hold data are now not so strong — there is a fast 20MB disc available. Of the memory 512K is of the external type; it is appreciably faster to access than the normal 128K of the QL. In addition, programming now allows specific access to the fast part of memory — not possible on the standard QL. Those who complained that the Thor 1 would not run games programs because it did not have a QL-type keyboard should be happy now, as the Keyrow command is supported — it will now also be provided as an emulation in Thor 1.

There are four slots for EPROMs, each of 32K size. The EPROM PCB also houses custom chips, including one which effectively serial numbers the machines and provides copy-protection in a new fashion. The reasons for the Xchange suite not being provided on ROM/EPROM are that updating is awkward and the space required is about 180K; using so much space would seriously restrict the ability to have other firmware. There is no 7.5-12.5MHz speed switch for new and old software, as used on PC-compatibles, there being no need for one. The physical difference between 12.5 and 16.7MHz versions will be just two different chips and different crystals.

Psion suite

The Psion Xchange suite is provided on disc. It means that the Psion quartet can all be loaded at the same time; sharing of the code allows several files to be accessed by each program, saving much memory. Obviously this is not full multi-tasking but the QL always had some capability for this and that is now extended; the CTRL C function has been replaced by a "system request" and it is possible to have other compiled or machine-coded programs running alongside Xchange.

Programs, Psion included, are accessed by single presses of the "Sys Req" key. The Psion programs are somewhat better versions than on the QL and some odd bugs have been sorted out. The Xchange version used for this review of the Thor 20 was 3.86 but there is a later version; there has been no need to re-write it for the Thor 20.

The suite is essentially the same as used on PC-compatibles. For those who have not used Xchange, the improvement over the separate programs on the QL is well worth having. Quill has Export and Transfer functions, the latter allowing a file to be saved without control codes. The cursor movement is significantly faster, removing possibly the main irritation from the use of this program.

Development

When using the Psion quartet, the Thor 1 is about 15 percent faster than the QL and the Thor 20 is about 20-30 percent faster than the Thor 1, giving a speed improvement of around 40-50 percent over the QL. Those figures may not sound sensational but the subjective improvement in the feel of Quill, for instance, will be considerable.

It is not intended to provide MS-DOS emulation, i.e., PC compatibility, because the cost would be greater than that of buying a cheap alternative computer and linking it to the Thor RS232 port. The new IBM PC eventually will have a new operating system anyway. CP/M emulation will be considered but that operating system is now rather too long in the tooth to be bundled with the Thor. It is not surprising at this stage in the development of the Sinclair Z-88 that there are no plans to link it to the Thor. The Psion Organiser will certainly be linkable. There is also a possibility that existing customers will develop a printer driver for a laser printer.

For software developers, CST supplies full documentation for the Motorola MC 68020 and MC 68881 maths co-processor and an extended macro assembler from Talent which supports the full instruction sets for those two chips, plus a linker from GST.

The QL appears to be relatively more popular overseas than in the U.K. and the same is expected with the Thor. Strong interest has already been shown from Scandinavia and Italy and those other great fans of the QL, the Germans and the Spanish, will no doubt be buyers. Even for those who cannot aspire to such a machine, the Thor 20 will be a boon, because of the extra lease of life it will give to its forefather, the QL. It will encourage hardware and software developers to continue working on products which have relevance to us all.

Table 1
Speed comparisons

BM1-8, MAC1-4 and PRIMES are SuperBasic benchmark routines from David Guthrie, in the Quanta Library; PRIMES(TBO) is PRIMES compiled, using Turbo Supercharge. The routines were run with the computers in F1 mode; some routines would take longer in F2 mode.

The memory speed check is from the Turbo Supercharge compiler manual but is a SuperBasic routine. All times are in seconds.

It should be borne in mind that individual specimens of the same model vary appreciably in speed.

Routine:	Basic	640K	256K	Thor	Thor
	QL:	QL: [*]	GL: [*]	1:	20:
BM1	1.9	1.6	1.4	1.6	1.2
BM2	5.7	5	4.3	4.7	4.3
BM3	9	8	8	8	7
BM4	10	8	7	8	7
BM5	12	10	9	19	9
BM6	26	22	20	21	19
BM7	42	36	32	34	31
BM8	22	18	16	18	15
MAC1	89	74	67	72	63
MAC2	18	17	17	16	11
MAC3	57	49	45	49	28
MAC4	81	80	81	79	54
PRIMES	254	212	193	205	189
(TBO)	26	18	14	16	17
MEM_SPEED	32	22	17	17	4
DEMO_TURBO	10	6	4	#	3
DEMO_QLIB	32	19	15	#	14

*The 640K QL had a 256K MP internal expansion and a 256K PCML external expansion. The 256K QL had a 128K TR external expansion; this is about the fastest QL set-up.

DEMO_TURBO/QLIB is a set of four routines for creating and sorting numeric and alpha strings. The TURBO version was compiled by that program and uses six character strings; the QLIB version was compiled by that program and uses four-character strings. It is the current phase of the long-running Turbo Supercharge versus QLiberator saga!

#The Thor 1 used was one of the originals and did not have Keyrow emulation, so that it could not run all four parts of these two tests; from the timings on the first part, totals of about three and 14 seconds would seem likely. It also appeared that the QL PCB in this machine was slower than the one in the 256K QL with TR expansion.

TURBO v1.14

"Dramatic... bug free... an excellent program... a great advance on Supercharge... more capable (than the latest version of QLibrator)... the fastest SuperBASIC compiler so far... mind-blowing... takes SuperBASIC and the QL into a new era... With TURBO we should start to see programs which are unthinkable on any other small machine." QL World, April 1987

STANDARD PERSONAL COMPUTER WORLD BENCHMARKS INT REAL
1 2 3 4 5 6 7 MATH MATH
SuperBASIC 1.7 4.8 7.9 7.7 10.0 20.2 36.5 10.4 13.2
TURBO (float) 0.1 0.2 0.5 0.7 0.8 1.7 2.4 n/a 0.6
TURBO (int) 0.05 0.08 0.2 0.15 0.25 0.55 0.9 0.15 n/a
vs SuperBASIC 34000 60000 40000 51000 40000 37000 14000 69000 22000
vs QLIB v3.1 200% 500% 350% 470% 300% 240% 240% 300% 230%
* ALL tests performed on JS, QL & Sandy 512K expanders - ratios with AH/JM QL or faster RAM are even more favourable to TURBO. QLibrator was set for its maximum speed. The benchmarks tell a remarkable story - TURBO produces code that typically runs THREE HUNDRED PERCENT faster than does the QLibrator interpreter. The figures are similar to those comparing a Leda with a Lamborghini (but without the price differential). STOP PRESS! stop press! STOP PRESS! stop p * In the May/June 1987 issue of FORUM QLiberation provided their own demo benchmark - chosen, written & compiled BY THEM... Shame they didn't test it with TURBO! The TURBO's d code is not only more concise but is OVER FOUR HUNDRED PERCENT FASTER! Ouch! Proof has been lodged by DP with QL WORLD and its troubleshooter. Other painful (to them) examples include simple string concatenation (10 DIM A\$(32000) 20 FOR Z=1 TO 32000: A\$=A\$+X") where TURBO is an amazing TWO THOUSAND ONE HUNDRED PERCENT faster than QLlib.
* Many users have compared DP with Borland, the leading software producer for IBM clone machines. We are not that flattered, as our own TURBO QL benchmarks with BORLAND'S TURBO BASIC shows that we are 15 times faster (in local) than they are. Here are some of the comparisons that have been submitted from SUPERCHARGE/TURBO technology: QL USER WORLD QUANTUM CSET DS = EIDERSOFF + PDQL + PYRAMIDE + DANSOTF + ULTRASOFT + MD + MIRACLE + HISOPT + SHADOW + TRANSFORM + CURRY + ABC + SEXTOR + TESSTERRAT + COMPATIBILITY: TURBO will intelligently compile any correct SuperBASIC program (except for interpreter-only words like EDIT). Unlike the interpreters (the one that's free and the other one) TURBO does not blindly accept dangerous rubbish (eg: 10 DEFPROC NAME20 RELOOP 30 ENDEF NAME1 40 ENDEF LOOP - try this in SuperBASIC); TURBO autocorrects bad programs. Both interpreters are rather stupid - they are unaware of faults, with the result the program runs erratically (FREE ON RECEIPT OF AN ORDER OR AN SINCE DP's "LIST OF THE WORST INTERPRETER BUGS"). The sad fact is that your interpreter not giving an error message is NO GUARANTEE that your program is working in the way that you think it does... For safe programming you simply can't do without TURBO.

* Supremely easy - use a beautiful front-end, on-screen help, instant abort, no LENSLOK, window adjustable during compilation, multitasks while compiling, configurable buffer size/window copying/DATASPACE from front-window, user configurable avoid/binding keyshashing, adjustable report file (to screen/print/file etc.) in full command-line mode
* Supremely flexible task communications - use PRINT and INPUT to communicate between any number of multitasking jobs - even arrays can be passed, and channels can be shared! Option strings can be passed as parameters of EXECUTE.
* Supremely free from restrictions - you can use procedures or functions in any task from any other task! Generate tasks as large as the QL's 640K RAM - or go down the module route (we supply a program to help you) and instantly link.
* Supremely Servile (!) - TURBO lets you choose between switching diagnostics on/off (off = shorter code), and between setting optimisation to global speed/localised speed (on a statement block basis) * size * size with localised speed * none, a total of 15 options. You are in the driving seat. If you slip up, we give you a report that pinpoints your mistake, exact to the character!
* Supremely feature-filled: Virtual arrays, rubber arrays, implicit datatypes (accelerated, fully re-entering FOR loops and integer/STRING SELECT on all QLs), full WHEN - ERROR trapping of any error on any QL version, to a single point (error handlers - you can have any number of them, hierarchically laid-out - have full access to line and error numbers, and you can RETRY or CONTINUE (RESTART as you choose) even when in another task, parameter passing by reference as well as by value, 9 digits of displayed accuracy, etc.
* Supremely powerful TOOLKIT included, with ONE HUNDRED AND EIGHTY (180!) really useful commands, utilities and functions for the BASIC programmer. There is no space to even begin to list them - suffice it to say that TURBO TOOLKIT's most 'comprehensive' rival has little more than half as many features. The TOOLKIT (which is RAM based) is designed to complement existing toolkits (eg. the SuperToolkit)
* Supremely documented - a THREE HUNDRED AND FIFTY FOUR PAGE lucid, illustrated user encyclopedia.
* Supremely generous - there are no royalty restrictions on TURBO's programs.

The TURBO System costs £99.95 COMPLETE

TURBO IS BRILLIANT. PRESS COMMENT FROM EVERY SOURCE IDENTIFIES IT AS THE MOST OUTSTANDING BASIC COMPILER FOR ANY MICROCOMPUTER. The TURBO TOOLKIT is included in the complete system for just £29.95. This amount will be credited if you subsequently purchase THE TURBO SYSTEM.
"You're getting good value, and there is a lot more... TURBO TOOLKIT is a comprehensive product which will not leave you wondering where your money went - it offers a wide range of facilities to everyone (whether or not they own a compiler)!" QL World, December 1986.

PROFESSIONAL ASTROLOGER V1.5

NEW FASTER VERSION (TURBOCHARGED)

* Amazing Astrology system * Supplied with 140 A4 page manual which assumes no knowledge of astrology * Gives 10 A4 pages of personality/character delineation * Gives 6 A4 pages of day-to-day and year-to-year personalised text predictions * Gives 3 A4 pages of text comparisons between two people * Massive 300K of user adjustable text files (480K for disk users) supplied together with machine code editor * Incredibly fast - 0.5 seconds/computation * One minute accuracy this century * Exact hardcopy on all options - 16 print modes, user definable astrological glyphs and printer driver * "One-of-a-kind... every requirement provided for... descriptions such as superb... The most powerful & complete astrology package on any micro... provides everything that a present day Nostradamus will need... the ultimate astrology package... a 5-star (☆☆☆☆☆) program - a Sinclair User Classic (the highest award given to any program)" SINCLAIR USER.
"The best Astrology program of them all" PREDICTION, Europe's leading astrological magazine.
PROFESSIONAL ASTRONOMER is £10 extra for users of Professional Astrologer. ASTRONOMER has a full planetarium display, a choice of 5 coordinate systems. Moon/Mercury/Venus/Mars actual face display with real shadows and eclipses, automatic parallax correction (only NASA has this), solar system display in parallel projection with zoom, tilt, freeze, autocomment, etc. If not bought at the same time as Astrologer, the price is £12.95.
£59.95 Complete with huge manual, or £69.95 with Astronomer

SUPER MEDIA MANAGER V1.12

An essential program for anyone who uses microcartridges and/or disks to store things of value! No more need for you for the safety of your programs & data. Super Media Manager provides a host of device management facilities, including:
* Selective direct, copying, and erasing
* Sector loading and viewing (cursor controlled)
* Sector editing - Hex and ASCII input allowed
* Automatic reports when mapping sectors
* Full support for QL and QL+ drives
* Viewing, printing, or saving of drive map details
* Automatic (semi-auto on disks) recovery of deleted files
* Recovery of corrupt files to new files
* Header block or Disk-type information display
* String searching by sector or file - ultrafast
* Full directory sort facility, by name/type/date etc.
Control upto 256 separate cartridges/disks - DIRECTORY OF DIRECTORIES
"SMS has every possible facility... it's got to be a world beater" QL World, November 1986

£39.95 COMPLETE WITH 98 A4 PAGE MANUAL OR £24.95 FOR A CARTRIDGE ONLY VERSION

- UK delivery costs are all-inclusive. Europe add 5%, elsewhere 10% to cover airmail costs.
- Program upgrades can be obtained by sending us the original cartridge (NOT the packaging or documentation) plus £10 (£12 Europe, £15 elsewhere).
- SUMMER BONUS - £1 off if you buy 2 programs, £2 off on 3, £3 off on 4, etc.
- A deluxe stand-alone keyboard is available for £89.95 (it has numeric and cursor keypads) - or just £174.95 if bought together with TURBO. Or get TURBO + ICE £119.95 - or £129.95 including CHOICE.
- The GigaMOUSE system and the GigaSOUND system cost £89.95 each - 10% discount if bought with any DP program.

To: DP, 222 THE AVENUE, LONDON E4 9SE (Or use the Credit Card Hotline 01-527 5493)

Please rush me...

Name.....



DIGITAL PRECISION DESKTOP PUBLISHER

NOW VERSION 2.0

WELL WORTH THE UPGRADE!

A Full Function Machine Code Desk Top Publishing System! No more need to suffer constant file updating, primitive graphics, achingly slow screen updating, occasional lockups. DESKTOP PUBLISHER's specification, speed and performance equals or exceeds those of packages costing hundreds or thousands of pounds... Total user control! FULL WYSIWYG (What You See Is What You Get) * Extreme user friendliness * 12 integral graphic fonts * 10 integral QL text fonts * 150 integral graphic symbols * 160 integral paint brush shapes * 10 integral font styles * 150 integral decorative fonts * 10 integral line styles * 10 integral fill patterns * 10 integral borders and margins generated from a graphics menu * all proportions rededing pixel by pixel * centre and true-descender editing of characters * merging with AND/OR/XOR * whole and partial inversion * mirror imaging * Swishable grid * separately adjustable X & Y axis magnification and reduction * up to 15 zooms * Stipples * Stripes * rotation * importing of text and non-text documents from the Editor * Importing of text documents from wordprocessor * Importing of screens from other QL programs * Importing of colour palettes from EYE-Q * Importing of screens from other QL programs * Importing of screens from other QL programs * Importing of full screens saved by any graphics package * Freshred drawing of screens with restriction free mixing/overlapping/combining of text and pictures * Full cut and paste facility * selective save * hierarchical escape-undo function - you will not lose things accidentally * 960 x 800 pixel drawing area * if you have a fully expanded

DESK TOP PUBLISHER COSTS £69.95

"Will not make the coffee, but they're working on it. A very very impressive system". POPULAR COMPUTING WEEKLY

DESK TOP PUBLISHER + EYE-Q COSTS £94.95

DESK TOP PUBLISHER + THE EDITOR SPECIAL EDITION COSTS £104.95

DELUXE DESK TOP PUBLISHER (including EYE-Q + SPECIAL EDITOR) COSTS £124.95

THE EDITOR v1.17/1.18 SPECIAL

page improvements of 100 times, copying improvements of over 1000 times, etc...

* Flexible - Editor can load and handle text, Quill documents, SuperBASIC programs, listings in assembler or high level languages, QL screen, disk files, machine code editor etc.

* Text editor - can use Quill or Editor, both controlled by Editor itself! - and you can choose your own font to suit.

* Feature-packed - an independent count of features, along with the characters to act as delimiters for word searching or replacing! * Now with a new all-singing, all-dancing printer driver - lets you start where most Editors stop!

* Lucidly documented - new larger manual.

command files (using ANY/ALL of the 102(!) commands) for subsequent execution. In the SPECIAL EDITION, these command files can have up to nine parameters each - pause & think what that means! * Text editor - controlled by Editor Manager, even Editor itself! - and you can choose your own font to suit.

* Freely - with full on-screen help and a very flexible configurator giving you access to everything (screen shape, size, position, three ink colours, three paper colours - even the characters to act as delimiters for word searching or replacing!).

* Now with a new all-singing, all-dancing printer driver - lets you start where most Editors stop!

* Lucidly documented - new larger manual.

A superb spelling checker for Editor (30000+ word vocabulary!) is available at a cost of just £29.95

EDITOR costs £29.95

With many more features SPECIAL EDITION EDITOR costs £39.95 and needs extra RAM

EYE-Q v2.1 The Definitive QL Graphics/CAD System

Fully driven by pop-up menus * single key entry * several zooms * windowing * proportional movement * painless rubber bands * arcs * ellipses * circles * lines * files * replicable sprites * horizontal & vertical stretch * reflect & invert * transfer & pan/cross (use the scroll wheel) * font design editor * automatic anti-aliasing * graphic screen compression * offset display * on-screen help * XOR/OR cursor with variable width * paint * recolour * magnify * reduce * text inclusion * freehand movement * localised save/load/pan/recolour/zoom * full screen graphics * full range of QDOS colours & stipples available through paintbox * user-definable defaults * 2 font supplies * 4 colors * 400x400 pixels * user definable drivers (using QDOS compatibility, graphics mode, density etc) - hundreds of printers supported * improved fill & compress * 3 font sizes * 3 line thicknesses * 3 line styles * 3 background colours * full compatibility with SUPERCHARGE, TURBO, SSG V4.0, joysticks + TURBO TOOLKIT * monochrome save * localised options on all full-screen operations * user switchable resolution * SuperBASIC extensions supplied free *

Two artistic but provocative demo screens supplied - prides stay clear! * Includes every conceivable drawing option... is simple to use... a powerful CAD system of monumental proportions... outstanding... a brilliant concept, highly innovative... accuracy is superb... very well produced, incorporating the best features of other graphic programs... very original, useful... highly innovative functions... "QL WORLD"

"Digital Precision is right, this is the definitive QL art package - go out and get it. This program wins, no problem!" SINCLAIR USER
"Up to now, the last word in graphic packages for the QL has been from Talent. EYE-Q has more features, is considerably easier to use, and is also about half the price!" POPULAR COMPUTING WEEKLY

EYE-Q costs £29.95 complete with lucid A4 documentation

EYE-Q is fully compatible with DP's new DESKTOP PUBLISHER

The GIGA mouse version of EYE-Q costs £34.95

SUPER SPRITE GENERATOR VERSION 4.0 DE LUXE

Supreme power in its final form. New manual, upto 256 multicoloured sprites, upto 256 planes, upto 16 frames each, windows with screen 1 and 2, 100% flicker free, individually variable speeds, hundreds of special effects. Works with keyboards from SuperBASIC or machine code new faster integer keywords supplied - rapidly compiled with SUPERCHARGE, TURBO, SSG V4.0, etc. The sprites produced are very good! POPULAR COMPUTING WEEKLY

"Excellent" THE U.S. COMPUTER & ELECTRONICS & COMPUTING
"The results that can be achieved on the QL are outstanding" POPULAR COMPUTING WEEKLY

£29.95 COMPLETE, £24.95 IF BOUGHT WITH EYE-Q

SUPERDUMP £19.95 NEW!

This amazing new DP release is a must for everyone who wants SUPERDUMP graphic printouts from an EPSON or OKI compatible printer. SUPERDUMP gives you an incredible TWENTY TWO pages/sector, with user-controllable colours/shades and upto 16 sectors per page. It's also easy to use, multitasking, ultrafast, and compatible with EYE-Q (including condensed multi-sector modes) and ALL OTHER graphics packages. Special PCB dump modes included: no more need to buy slow, inflexible, expensive PCB designers - use EYE-Q + SUPERDUMP.

SUPERFORTH V2.0

The full multitasking, stand-alone, high speed FORTH 83 system is now supplied with an extremely powerful compiler. He also had the 1983 World Champion program from MOI!. This latest version has new extended documentation and full string handling. Now fully compatible with 69000 code & QDOS.

"Succeeds very well" QL WORLD

"The Definitive FORTH... excellent... very fast... user-friendly... the best" QUANTUM

SUPERFORTH costs £39.95 complete with 100 page A4 manual

INCITING NEW HUGE 696K TOTAL HIGH-SPEED RAM EXPANSION PLUS DISK INTERFACE PLUS SUPER TOOLKIT PLUS RAMDISK PLUS MEMORY-CUP PLUS FULL MONITOR / DISASSEMBLER just £194.95, or £404.95 INCLUDING DUAL NEC DS/3D 3.5" DRIVES. Special introductory offer - £25 part exchange allowance on ANY working QL RAM expansion or disk interface (660 part exchange for 512K SuperBOARD, £40 for 256K PCMCIA). Act NOW!!!

SUPER

ASTROLOGER

£24.95

BETTER BASIC EXPERT SYSTEM

This does what its title implies, and its use is in analysing, correcting and annotating programs written in SuperBASIC or programs in other BASICs to be translated into SuperBASIC. BETTER BASIC is user-configurable and very easy to use.

"Excellent - a 5 star program" SINCLAIR USER, December 1986

"Intelligent - does what it sets out to do" QL World, Jan. 1987

BETTER BASIC costs £24.95 complete with manual

BLOCKLANDS £9.95 D.P. Classic ERKAWEE

"An addictive game... at twice the usual speed" QL WORLD

DROIDZONE £9.95

"mind-numbing" SINCLAIR USER

SUPER ARCADIA £9.95 QL WORLD

"We flipped over SUPER ARCADIA" HOME COMPUTING WEEKLY

SUPER REVERS £9.95

Did you think Psion Chess was strong?

SUPER BACKGAMMON £12.95

"Brilliant" QL WORLD

Any 3 for £24, any 4 for £30, all 5 for £36!!

ARRIVAL SIMPLY ABSOLUTELY IMMINENT!!

MASTER BRIDGE TUTOR - It plays BRIDGE too, & ACOL is its mother tongue....

EXTRACTS FROM QUANTUM: TURBO - Second to none... excellent... nothing can match it - TOOLKIT - An excellent investment EDITOR - Its uses seem endless... DP's best program... a joy to use EYE-Q: Superb... the best graphic program available BETTER BASIC - An absolute must

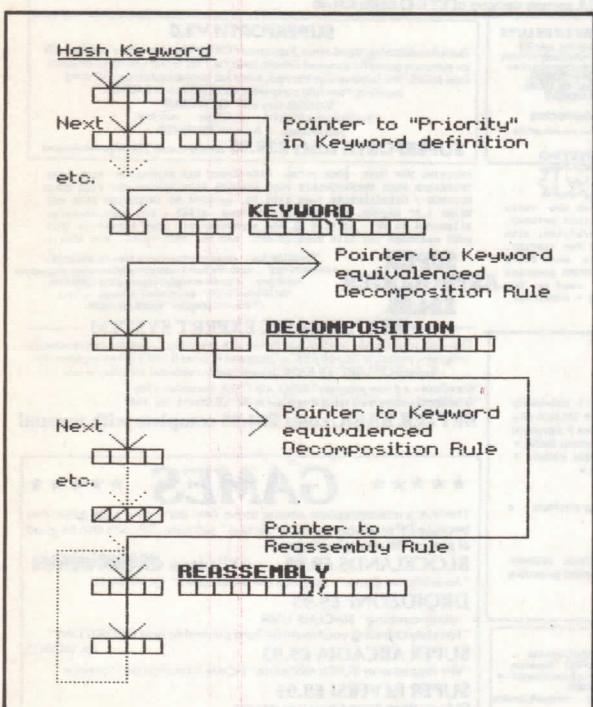
£49.95 with 110 page A4 Manual.

CHEAP MICROCARTRIDGES - £13.00 PER TEN £12.00 PER TEN IF ORDERED WITH SOFTWARE

TOO MUCH

TALK BACK

Charles Gerrard puts himself into the psychiatrist's chair as he takes apart the famous Eliza conversion program and finds what makes Eliza tick.



•Figure 1. Do not make a hash of it, Eliza — the hash algorithm in this script structure converts first letters of keywords onto integers.

•Figure 2. Take a seat, Eliza — a section from the Doctor version of the Eliza program in the MAD-SLIP list structure.

```
(ARE O
( ( O ARE I O )
(WHY ARE YOU INTERESTED WHETHER I AM 4 OR NOT)
(WOULD YOU PREFER IF I WEREN'T 4)
(PERHAPS I AM 4 IN YOUR FANTASIES)
(DO YOU SOMETIMES THINK I AM 4) )
( ( O ARE O )
(DO YOU THINK THEY MIGHT NOT BE 3)
(WOULD YOU LIKE IT IF THEY WERE NOT 3)
(WHAT IF THEY WERE NOT 3)
(POSSIBLY THEY ARE 3) ) )
```



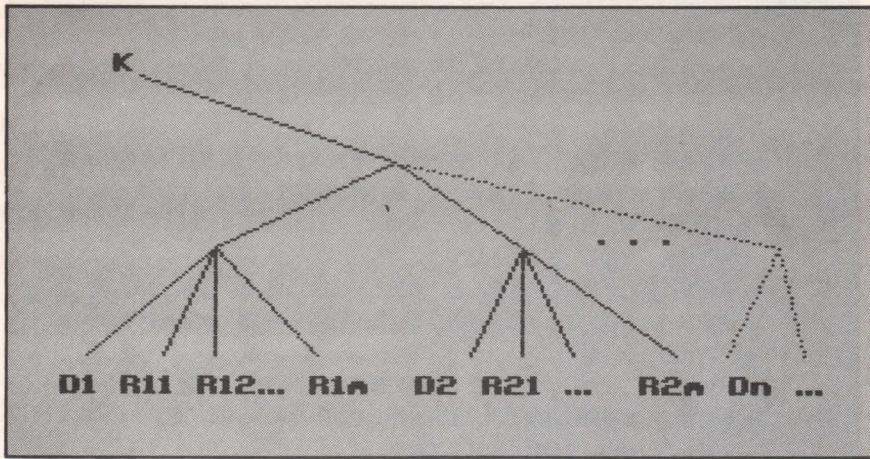
One of the reasons people enjoy working on computers is that they rarely talk back, other than with the obvious "Syntax error at line...". It would be more interesting, however, if the computer could sustain a slightly more informed and intelligent conversation.

In this article, we develop a program which will converse rather crudely in natural English. The two programs which illustrate the idea are available through Microdrive Exchange, called *Psycho*.

A program which will converse with the user in natural English is not a new concept. As long ago as the mid-60s, Joseph Weizenbaum wrote his famous *Eliza* program. It was written using a list processing language known as MAD-SLIP.

The best-known version of the program — the DOCTOR script — was designed to act like a Rogerian psychotherapist. That application was particularly suited to programming, as the psychiatrist is not supposed to add anything to the conversation but instead to prompt the patient to talk further. So, for instance, if the patient said something along the lines: "I have a particularly large kitchen" the psychiatrist might answer with something like: "Tell me more about your house" or "Do you enjoy cooking" without appearing ignorant of the subject. If that kind of reply occurred during normal conversation, you would probably give the speaker some strange looks.

Examining the replies in a little more detail, it is obvious that the psychiatrist has connected the word *kitchen* either as a room in the *house* or with the theory of *cooking*. Bearing this concept in mind, the replies given are very non-



•Figure 3. Climb these branches, Eliza — a tree diagram to represent the keyword and rule list structure of the Eliza program.

committal, requiring no further knowledge of the subject.

The first process which needs to be carried-out by the conversational program we are to develop is substitution. By substituting a few of the words in the original sentence, seemingly intelligent replies can be formed. Weizenbaum likens the process to that of a foreigner with a limited knowledge of English. Suppose the foreigner heard the sentence: "I have my own car now."

With no knowledge of the subject area, or even of what the speaker may be talking, simple substitution rules are sufficient to continue the conversation with the sentence:

"You have your own car now". The speaker might continue with: "I bought it last thursday". To which the foreigner would reply: "You bought it last thursday" and so on.

Though perfectly correct English, that kind of conversation would soon become boring. The problem is that although the foreigner is constructing legitimate replies, the sentence appears exactly the same as the input. The trick is to transform the sentence into something which appears different.

Priority

Figure two shows a section of the script from the Doctor version of the Eliza program. It is given in the MAD-SLIP list structure which is very similar to Lisp. The first item in the list is the keyword *Are*. It is followed by the priority of the keyword, in this case zero. When the computer is trying to compose its reply, it scans the entire input sentence for the keyword which is in the script. If it finds more than one, it considers the one with the highest priority.

The rest of the structure contains lists containing a Decomposition rule fol-

lowed by one or more Reassembly rules. In the first case, the decomposition rule is '(O ARE I O)'. The Os match any number of words. Remember that word substitution will already have taken place, so this decomposition rule would match the sentence *Are you making fun of me* which would have been substituted into *Are I making fun of you*.

Having matched the decomposition rule to the sentence, the input sentence is literally decomposed into the relevant sections. In this case, bearing in mind that the 'O' represents "any number of words", there are four sections to the sentence. They are:

1. "" (Nothing)
2. "ARE"
3. "I"
4. "MAKING FUN OF YOU"

Having decomposed the sentence successfully, it is necessary to reassemble it using the re-assembly rule. If there is more than one reassembly rule for a given decomposition rule, the system cycles through the reassembly rules using the next one each time the decomposition rule is matched. That adds variety to the replies by the computer, even when the input is very similar. If we consider the first reassembly rule, which looks like *Why are you interested in whether I am 4 or not*.

The '4' means that the fourth section of the decomposed sentence should be inserted, so the final answer would be:

Why are you interested in whether I am making fun of you or not.

The next reassembly rule would give the answer:

Would you prefer if I weren't making fun of you, followed by: Perhaps I am making fun of you in your fantasies and, finally:

Do you sometimes think I am making fun of you.

If the decomposition rule for the

keyword 'ARE' does not match the sentence, the system tries the next decomposition rule, which should be either very different or more general. All the rules are tested in order, so there would be no point in having the rule '(O ARE O)' followed by '(O ARE I O)', because the first rule is bound to match sentences of the type which match the second rule. Consequently, the second decomposition rule and its associated reassembly rules would never be used.

Reassembly

The keyword and rule list structure of the Eliza program can be represented by the tree diagram in figure three. The top level of the structure contains the keyword. It is followed by a set of lists, each of which contains one decomposition rule followed by any number of reassembly rules. This type of structure imposes no bounds, other than that of memory, on the number of keywords which may be included, the number of decomposition rules per keyword, or the number of reassembly rules per decomposition.

In the original MAD-SLIP DOCTOR program the script contained 50 keywords. For speed, the keywords were randomised — hashed — to produce a seven-bit integer which determined the place of the keyword in the list.

Hashing is a means of finding unordered data quickly by applying a function to the input. For instance, in the original program, hashing the keyword 'ALWAYS' produced the integer '14'. The list structure for this keyword was then placed at this point in the keyword dictionary. When the input sentence is being scanned, rather than having to search the entire dictionary of keywords for each word in the input sentence, each word is hashed and only the small part of the dictionary which produces that hash result need be searched.

Majority

On the whole, it is rare to find a home computer with a built-in list structure. Therefore the majority of Eliza-type programs written for micros are either in a language such as Lisp, or search through a list of DATA statements containing the script, this being the list of keywords, decomposition rules and reassembly rules.

We could easily write our program in Lisp but it would make it more difficult for many people to understand and it would make it impossible for the majority of people to make any changes to it, as they are unlikely to have the Lisp language. Therefore it is more sensible to

write the program using SuperBasic. That takes us to the problem of speed. One of the big advantages of the QL is that of memory — there is plenty of it. That means we can easily compose large scripts but if we search DATA statements for keywords there is likely to be a long delay before the computer replies to the user input sentence.

Further, most programs of this form do not have the flexibility of the original program which was able to match alternate words to a sentence, cross-reference between keywords and so on. It is possible to include all this as but it will slow the program operation still further.

The solution is to set up a list structure directly in memory and operate on it. The easiest way to do this is to have a separate program which reads a script from DATA statements and organises the list into an area of the RESident Procedure (RESPR) memory. This list structure can then be saved using LBYTES and used by a second application program which loads it using SBYTES.

Not only does that give the flexibility of the original list structure but it allows us to hash the keywords for speed. Further, changes to the script can be made very easily by changing DATA statements in the list-formation Super-Basic program.

Rather than prolific use of brackets to form the lists in the DATA statements, a more obvious format has been adopted. It can be seen by the small section of script shown in figure four. Each keyword structure should start with an asterisk * followed by the keyword. The next item should be the priority of the keyword. The higher the number, the higher the priority, with the highest keyword being used when more than one occurs in the sentence.

Flexibility

The priority integer can be followed by either a single equivalence rule or by a decomposition rule and a number of reassembly rules.

If you use an equivalence rule you should include the equals sign '=' followed by the keyword you are equivalencing. That ends the particular keyword structure. The equivalenced keyword should already have appeared in the script or an error message will be generated. When the computer encounters this format it will use the equivalenced keyword to decompose the sentence, assuming this has the highest priority. In this way, a number of keywords can share the same set of decomposition and reassembly rules, saving space and adding more flexibility to the system.

The alternative to the equivalence rule is the decomposition rule, which should start with the plus symbol '+'. A typical

```
*WAS . 2
+ @ WAS YOU @
/WHAT IF YOU WERE @4 ?
/DO YOU THINK YOU WERE @4 ?
/WERE YOU @4 ?
/WHAT WOULD IT MEAN IF YOU WERE @4 ?
/WHAT DOES ' @4 ' SUGGEST TO YOU ?
+ @ YOU WAS @
/WERE YOU REALLY?
/WHY DO YOU TELL ME YOU ARE @4 NOW?
/PERHAPS I ALREADY KNEW YOU WERE @4
+ @ WAS I @
/WOULD YOU LIKE TO BELIEVE I WAS @4 ?
/WHAT SUGGESTS THAT I WAS @4 ?
/WHAT DO YOU THINK?
/PERHAPS I WAS @4 ?
/WHAT IF I HAD BEEN @4 ?
```

•Figure 4. Do it this way, Eliza — small section of script to show the more obvious format adopted instead of copying with prolific use of brackets.

example of a decomposition rule might be:

+ @ I ARE @

where the '@' symbol represents "any number of words". Remembering that the 'I' has been substituted from 'YOU', this would match input sentences such as:

I think you are stupid

which would be decomposed into the four sections:

1. "YOU THINK"
2. "I"
3. "ARE"
4. "STUPID"

In addition to the '@' symbol, the hash '#' may be used to substitute for exactly one word.

Another feature which may be included in the decomposition rule is optional matching. In this case, optional matching words are enclosed in brackets. So, for instance, the decomposition rule:

+ @ YOU (WANT NEED) @

would match a sentence such as:

I want a new computer

or:

I need a new computer

just as easily.

Following the decomposition rule, you should include one or more reassembly rules. They start with the slash symbol '/'. If you want to substitute sections of the original sentence into the final output, you can refer to a section using '@N' where 'N' is the number of the decomposed section. For example, if part of the data was:

```
*REMEMBER,5
+ @YOU REMEMBER @
/DO YOU OFTEN THINK OF @4?
```

and the input sentence was:

I REMEMBER MY YOUNGER
DAYS

this would be decomposed into the four sections:

1. "" (Nothing)
2. "YOU"
3. "REMEMBER"
4. "YOUR YOUNGER DAYS"

which would be reassembled as:

DO YOU OFTEN THINK OF YOUR
YOUNGER DAYS?

Remember that you may have as many reassembly rules as you like for each keyword. The program will cycle through them all before repeating itself, thus adding more variety to the replies.

The reassembly rule sequence is terminated either by a rule starting with a '+' — new decomposition rule for the current keyword — a '*' new keyword, or a pound sign '#' — end of script.

For anybody wishing to follow or alter the program, this script is poked into memory using the structure shown in figure one. The hash algorithm converts the first letter of the keyword into an integer in the range 0 to 25. This is by no means the most elaborate hash algorithm but unless you have extremely large scripts it will never have to search more than about five keywords to determine whether the input sentence word appears. That is far faster than searching through hundreds of lines of DATA statements, as is normally the case with these programs.

As you can probably imagine, with a reasonable script the final program is far too large to print in the magazine but it is available through Microdrive Exchange. The cartridge includes PSYCHO1 which forms the script from DATA statements, SCRIPT containing a variation of the original Doctor script with more than 50 keywords, and PSYCHO2 which operates on the SCRIPT list data and interfaces with the user.

SECTOR SOFTWARE

★ 0772 454328 ★

TOUCH TYPIST

Don't even think about buying a replacement keyboard until you know how to use the one you already have. Why type slowly when you can be typing at professional speeds letters, basic programs, data etc can all be entered in a fraction of the time now taken by learning to type correctly. Did you know that it is harder to type with two fingers than it is to type correctly. Touch typist is the fastest typing tutor available for the Sinclair QL. It will teach you to type at up to 211 wpm. It is 100% machine coded and has a keyboard tutorial to show you the keyboard basics, 3 teaching modes, adjustable speed and accuracy targets, very fast interactive keyboard, your results can be displayed on a graph and be saved to drive for future additions, the full lesson editor will allow you to alter and customise any or all of the 200 lessons which can then be save to drive to create a library of custom lesson sets, also included is a reward option where if selected providing you meet the requirements you specify you will be given a 100% Machine Code arcade game as a reward for your progress. Touch Typist will run from disk, microdrive or ramdisk. Available on disc or microdrive at only £12.

THIS IS WHAT QL WORLD HAD TO SAY ABOUT THE PROGRAM

"Succeeding admirably as a serious course intended for beginners and experienced typists alike, Touch Typist is a well presented useful utility which includes the professional polish of good quality software"—QL WORLD, July 1986.

SECTOR SOFTWARE, having bought the first two Z88's from Clive Sinclair would like to contact all
(QL USERS DO IT WITH THEIR FINGERS) users of this machine for our Z88 mailing list.
Car stickers.....£1.50

★ NEW ★

REAL TIME spelling checker for Quill or The Editor V.1-17 onwards on the expanded Sinclair QL. Checks input **BY THE CHARACTER** against its 30,000+ word dictionary. **SWITCHABLE 5 MODES OF OPERATION** to suit a variety of typing styles with **DICTIONARY AVAILABLE AT ALL TIMES**. **DISPLAYS EXAMPLE WORDS ON REQUEST**. **NO DISCERNABLE REDUCTION TO QUILLS SPEED OF OPERATION**. **DICTIONARY EXPANDABLE TO MEMORY/MEDIA LIMITS**. Available on Disc or Microdrive at only £29.95.

SPELL BOUND

QL SPARE PARTS

SERVICE MANUAL

THIS IS THE MOST UP-TO-DATE BOOK FOR REPAIRING THE QL. IT CONTAINS ALL CIRCUIT DIAGRAMS, FAULTFINDING CHARTS AND OSCILLOSCOPE DISPLAYS TO ENABLE YOU TO REPAIR YOUR OWN QL OR UNDERSTAND HOW IT WORKS £25.00

QL TEST SOFTWARE + RS232 LOOPBACK LEAD TESTS ALL THE MAJOR FUNCTIONS OF THE COMPUTER, EG SOUND, COLOUR, KEYS, RS232 MICRODRIVE ETC. AS USED BY REPAIR COMPANIES £14.00

KEYBOARD UPPER CASE INCLUDES, KEYS AND SPACEBAR	£16.00
BACK PLATE	£3.00
JS ROM SET	£28.00
KEYBOARD LOWER CASE.....	£5.00
ZX8301 ULA	£12.00
KEYBOARD MEMBRANE	£6.00
ZX8302 ULA	£13.00
BUBBLE MAT	£3.00
RAM 4164 150ns	£5.00

SOFTWARE

TOUCH TYPST	£12.00	TECHNOL	£49.00
TASK MASTER	£25.00	MEDIA MANAGER	£40.00
SPELLBOUND	£29.95	THE QUIL	£23.00
DFLASH RAMDISK + TOOLKIT ON		FRONT PAGE	£23.00
MICRODRIVE	£19.00	SCRABBLE	£15.00
SIGN DESIGNER	£16.00	ARCHIVIST	£30.00
CARTRIDGE DOCTOR	£13.00	GST MACRO ASS	£43.00
EYED	£29.00	FINANCE MANAGER	£19.00
ARROWVER	£17.00	DFLASH 16 EPROM	£24.00
TURBO	£99.00	KIDS DENDER	£20.00
THE EDITOR (DP)	£25.00	TALKIN' WORKBENCH	£20.00
PROJECT PLANNER	£20.00	SUPERCHARGE	£49.00
OBLIGATOR	£70.00	PSION CHESS	£17.00
FORTH	£34.00	BETTER BASIC (DP)	£20.00
MAILMERGE	£10.00	GST ASSEMBLER	£28.00
DECISION MAKER	£30.00	HOME FINANCE	£20.00
GARDNER	£20.00	REVERSI	£10.00
TOOLKIT 2 (EPROM)	£34.00	OXFORD TRIVIA	£18.00

39 WRAY CRESCENT, ULNES WALTON, LANCASHIRE PR5 3NA.

TEL: 0772 454328 PRESTEL MAILBOX 772454328

ACCESS AND VISA CARDS WELCOME.

PLEASE NOTE: ALL PRICES INCLUDE VAT & P/P.

Daniel Batty

TASKMASTER

THE "ROLLS ROYCE" OF MULTI TASKING

NOT just another multi tasking program, but a complete front end memory management system for the expanded Sinclair QL. ON SCREEN CALCULATOR with many features including delta percentage mark up/down.

POWERFUL FILE MAINTENANCE of discs/microdrives.

NOTE PAD with word wrap and "send note" feature.

SOFTWARE RESET scans for, and warns of any vulnerable open files at close-down.

SERIAL PRINT BUFFER, user configurable up to 32K.

DUPLICATE CODE SHARING allows you to load multiple copies of the same program without losing memory to additional code space. EG. 12 Abacus with 230K free.

COMMAND FILE MODULE easily creates files which will operate the machine in your absence. EG. Could load Quill, fill in your address, type a standard letter AND print it. You will however have to post it yourself.

SOME are under the impression that Taskmaster consumes large tracts of memory.

FACT if you only wish to use the multi tasking module then that is the only one that you need to load, thus using only a small slice of memory.

OBVIOUSLY if you wish to use any or all of the other integrated modules then progressively more memory will be used. THE CHOICE IS ALWAYS YOURS. Although complex in its actions Taskmaster is so user friendly that it was described as "VIRTUALLY IDIOT PROOF" by a major software reviewer.

AVAILABLE ON DISC OR MICRODRIVE AND STILL ONLY £25.00.

BETTER BASIC

Mike Lloyd looks at the importance of menu design for user-friendly programs.

Menu design is an important part of computer ergonomics. Many computer programs contain menus and some are completely menu-driven. The friendliness of such programs depends partly on how menus are displayed and organised and the way in which the user indicates choices. The bundled QL Psion programs include a surprisingly wide variety of menus, good and bad, and because most QL users will be familiar with them they will be used as examples.

A menu is traditionally a fixed choice of alternatives but, as computer programs have become more intelligent, menus have allowed a wider range of responses. Any series of requests for information from the user is a form of menu.

Menus present programmers with three basic problems to solve — how to structure menu options; how best to present options on the screen; how to detect the user's choice.

Menus can be structured in three ways — as a series of options presented one after another; as a list of options presented together; or as a series of menus and sub-menus. These structures can be described respectively as sequential,

concurrent and hierarchical.

Sequential menus present options in a strict order. An example of this method is provided by the Quill *HEADER* command. The user is guided through a series of decisions concerning the position of the header, text, vertical separation from the main text and typeface option in the order determined by the programmer.

Concurrent menus allow the user to make selections in any order from a number of options. For instance, the Quill *DESIGN* command presents a sub-menu of seven options, any of which can be selected by pressing the appropriate initial letter.

Finally, hierarchical menus, or menu trees, arrange options into groups and sub-groups. The general format of all of the Psion programs except Archive is hierarchical. The topmost Quill menu gives access to three main sub-menus, the help facility, the command menus and the typeface menu.

It is possible to go further into the hierarchy by, for instance, pressing F3 to enter the command sub-menu, pressing "O" to obtain the alternate list of commands, pressing "F" to access the file operations sub-menu, and then pressing "B" to begin a sequential menu to back-up a file.

The presentation of menu options on-screen depends to a large extent on the structure of the menu and the method used to select options. Choices could be shown in a dedicated area of

the screen, such as the Psion control area at the top of the screen. Alternatively, the screen could be cleared to present only menu options, as happens with the Design sub-menu. Another method is to use transient windows which over-write part of the screen temporarily. Options could be explained in words or by icons.

One problem facing software designers is how much on-screen explanation to give users. A large amount of information is useful when users are new to a package but too much hand-holding becomes tedious once people are familiar with the options. Psion uses four levels of user-friendliness. The command line at the bottom of the screen gives very brief prompts, the upper control area provides more detailed information and pressing F1 obtains even more information from the *help* file. If all of that on-screen assistance is not sufficient there is always the manual.

Programmers are faced with a wide variety of solutions to the problem of how to register the user's choices. The ideals to aim for are a minimum of keypresses, consistency throughout the program, clear relationships between keypresses and the options they represent, and the avoidance of potentially-fatal accidental keypresses.

One of the most straightforward methods of seeking information from the keyboard is to use the INPUT command but for single keypresses it is tiresome to have to follow each choice with an

ENTER keypress. Nevertheless, for multiple-character input the INPUT command, suitably trapped to prevent accidental errors, is useful.

Where options can be selected by a single keypress, either the KEYROW or the INKEY\$ command can be used. KEYROW is fast and ideal for detecting cursor or function key input because those key groups share one KEYROW parameter. INKEY\$ is slower at detecting keypresses but is easier to use for alphabetical or numerical input.

Menu options could be numbered or associated with a function key. That is an easy way to produce single-key entry but there are some disadvantages. Using the function keys limits the number of options in a menu to five and using the digit keys limits menus to 10 items. Both key sets could be extended by adding CTRL, SHIFT and ALT keypresses but using a limited number of keys for a wide variety of purposes can be confusing.

An alternative is to use mnemonics, usually the initial capital of each option. It becomes complicated when options share the same initial. In Quill, for example, P can mean Page, Print or Paint. That conflict about initials explains the choice of E for Erase in Quill but R for Rubout in Abacus; in Abacus E represents Echo.

Programmers must also consider how familiar users will be with the keyboard. A word processing program can be written assuming

KEYWORD OF THE MONTH

Early Basics ran on computers with little memory and so the luxuries of a fully-structured language had to be foregone. The keywords GOTO and GOSUB were therefore developed to redirect program flow. Their simplicity saved memory space but they have caused heated arguments about the merits of structured programming.

GOTO directs the program flow to the line number represented by the expression, usually a single number, which follows it. The expression does not have to be an integer, as fractions are rounded-down automatically. Neither does the parameter have to equate to a line which exists — interpreting will begin at the given line or the one immediately following.

GOTO is encountered most often in an IF statement, so that one set of actions is carried-out if an expression is true and another if it is false. For example:

100 LET X = RTND (100)

```
110 IF X > 99 THEN GOTO 800  
120 PRINT X  
130 GOTO 100  
800 STOP
```

GOTO and IF statements can be used to improvise REPeat loops, FOR...NEXT loops and even GOSUB statements. They provide sufficient structure to write all but the most complex programs. More sophisticated constructs are easier to use, make listings easier to understand and make programs run faster, which is why computer language designers have bothered to develop them.

One development of the GOTO concept is GOSUB, which stands for *Goto SUBroutine*. Whereas GOTO causes a permanent change of program flow, GOSUB allows a programmer to return to the statement which follows the GOSUB command and to continue with the original program flow. The subroutine must end with a RETurn command, as in this example:

```
200 LET X = 7 * 25: GOSUB 500  
210 LET X = X + 17: GOSUB  
500
```

```
2210 LET X = X - 52: GOSUB  
500  
500 PRINT X  
510 RETurn
```

GOTO and GOSUB are such essential features of so many Basic dialects that it is unsettling to be told that they are obsolescent in SuperBasic, yet the more powerful structures of SuperBasic make them redundant.

Purists claim that to use GOTO or GOSUB is inelegant, while others claim to be unable to recognise either elegant code or its advantages to the programmer. The argument is almost entirely irrelevant to software users because it is impossible to tell the quality of a program structure when it is running. Structures are there to assist the programmer and it is a matter of individual taste whether or not to use them to the full.

There are occasions when programmers should submit to the disciplines of structured programming. One example is writing software for the benefit of other programmers. That is why *Better Basic* routines

almost invariably avoid GOTOS and GOSUB's and why readers complain when *The Progs* includes unstructured programs. GOTOS and GOSUBs tend to make program listings impenetrable and tedious to debug or amend.

Sometimes, but very rarely, a GOTO or GOSUB will be preferable to a procedure call. Most GOTO jumps are completed faster than procedure calls and procedures which do not include parameters might be executed more speedily if re-written as GOSUBs. Another use for GOTO is to skip bits of untested code when developing programs. GOTO and GOSUB should never be used to force the program flow out of a procedure or function definition.

The debate on structured Basic will end not when GOTO and GOSUB are removed from the language but when Basic dialects finally rid themselves of line numbers. Nevertheless, SuperBasic is an important step in the direction of efficient structured programs.

that its users can type but a child's educational program might have to structure its menu round the function keys or the number keys rather than use mnemonics.

An alternative to character input is to use a cursor bar which can move over options under cursor-key control, with selections being made by pressing the ENTER key. This method is well-suited to mouse-controlled software.

Another favourite with mice is the use of graphic symbols called icons but some supposedly user-friendly menu systems use unintelligible and confusing icons arranged in a complex hierarchy of sub-menus which are so time-consuming to use that it would be easier to type-in

control words instead.

There are some general principles by which menus can be judged. Consistency is important, particularly in suites of programs, so that users learn a coherent menu system. Ideally, the cursor, ESC, TAB, SPACE and ENTER keys should have the same function throughout a program. Flexibility can be encouraged by giving users a variety of ways of indicating an option.

For instance, both ESC and Q could represent "Quit" and both Y and ENTER could mean "Yes" but it is always a bad idea to let all keys other than Y indicate No, for example, because an accidental keypress could have unforeseen and possibly

fatal results. There are sufficient opportunities to make disastrous errors without programmers adding to the confusion by carelessness.

Programmers should decide early in the design of a program what functions to ascribe to keys such as ESC and ENTER. For instance, ESC might take the user to the top level of a hierarchical menu or merely to the level above the current one. Once that choice is made there should be no exceptions to the rule.

The quest for single-key mnemonics should not lead to a profusion of short sub-menus, each using a handful of initials for different purposes. Two key mnemonics, such as those used by the Digital

Precision Editor, are an acceptable compromise between ease of use and a wide choice.

Menu hierarchies should be logical and should not prevent legitimate options being chosen. Some people use a number of printer drivers with Quill and the logical place for them to be selected is immediately before printing a document. Unfortunately, the printer driver must be selected prior to loading Quill. A better example is provided by the Paint mode — different typeface combinations can be selected by single keypresses and changed at will.

• Next month's feature will include listings for menu systems.

ENTERPRISES

Single Dattal Disk Drive (80 Track single sided) plus Dattal Interface including comprehensive toolkit all inclusive at £140 or with box of ten 3½" disks at £159.95.

Dual 3.5" Drives.....	£210.00	Dual Drives & CST Interface	£275.00
Dual Drive & 512k Interface	£400.00	Single Drive & CST.....	£200.00
Citizen 120D Inc All Leads	£225.00	Miracle Sys 512k	£114.95
Miracle Sys Modem.....	£47.50	M/S 512k & Ram Disk	£125.00
Sinclair QL 1 Year Service Contract and Four Free Books (JM)	£139.95	Cub Microvitec	£270.00
Sinclair QL 1 Year Service Contract and Four Free Books (JS)	£165.00	Schon Keyboard	£52.95
Books.....		Set of Seven Hutchinson QL Books for only £14.95 or £2.95 Each	
Sign Designer	£18.95	Ram Disk (World's Fastest).....	£14.95
Quantum Theory	£3.50	Exploring Artificial Intelligence on your QL	£3.50
QL Games Compendium	£3.50	The Hackers Handbook	£4.00
(QL World Recommended)		(QL World Recommended)	
Multi Task	£14.95	Eye-Q	£27.50
QL Paint.....	£19.95	Jabber	£9.95
Quboids	£9.95	Chess	£15.95
Meteor Storm	£9.95	Metacommco Assembler	£29.95
Computer One Monitor	£14.95	Lattice C	£84.95
Pascal.....	£74.95	Cash Trader	£39.95
Quill Adventure Writer	£19.95	Media Manager	£34.95
Supercharge	£48.50	Professional Astrologer	£48.50
GST Macro Assembler	£29.95		

All Products Subject To Availability



Please Find My Enclosed Cheque For

Rush me

My Name

Address

DS Enterprises, 25 Trinity Rise, London SW2 2QP. Tel: 01-671 0209

ACCESS & BARCLAYCARD TAKEN — CALL FOR DETAILS OF NON-ADVERTISED PRODUCTS

As of June 20th our new address will be: 108 Barnsley Road, Wath-upon-Dearne, South Yorks.

NEW DELUX VERSION

A REAL KEYBOARD
FOR THE QL

THE RAINBOW KEYBOARD

A PROFESSIONAL 'FEEL', SEPARATE
KEYBOARD WITH 81 FULL TRAVEL
KEYS INCORPORATING CURSOR AND
NUMBER PADS. SIMPLE TO INSTALL.
FULLY COMPATIBLE WITH ALL
SOFTWARE.



£89.95 Inc. VAT + P and P.

or **£174.95** Inc THE DIGITAL PRECISION
TURBO COMPILER.

QL REPAIRS

FROM £17.95

Phone for quote

BATTERY BACK UP FOR REAL TIME CLOCK
Maintains the date and time while the
QL is off

KIT £19.95

FITTED £26.95

640K MEMORY UPGRADE

KIT £110.00

FITTED £125.00

Overseas enquiries welcome



BUSINESS & HOME COMPUTER REPAIRS
Clark House, Haxby, York YO3 8HU. Tel: (0904) 768853

QL Time

Leslie Fahidy calls time on a clockface demonstration program

Some aspects of teaching the clock were given last month and I promised a full listing. Since the listing of the whole program amounts to eight pages of single-spaced A4 print, the editor and I agreed that it was not reasonable to publish it all. It would not be much fun for you to type it in. So, this month, apart from discussing some of the points of the finished program, I will give the listing of a demonstration program. The program will draw the clockface and ask the user for a choice of whether he wants to read the clock or set it.

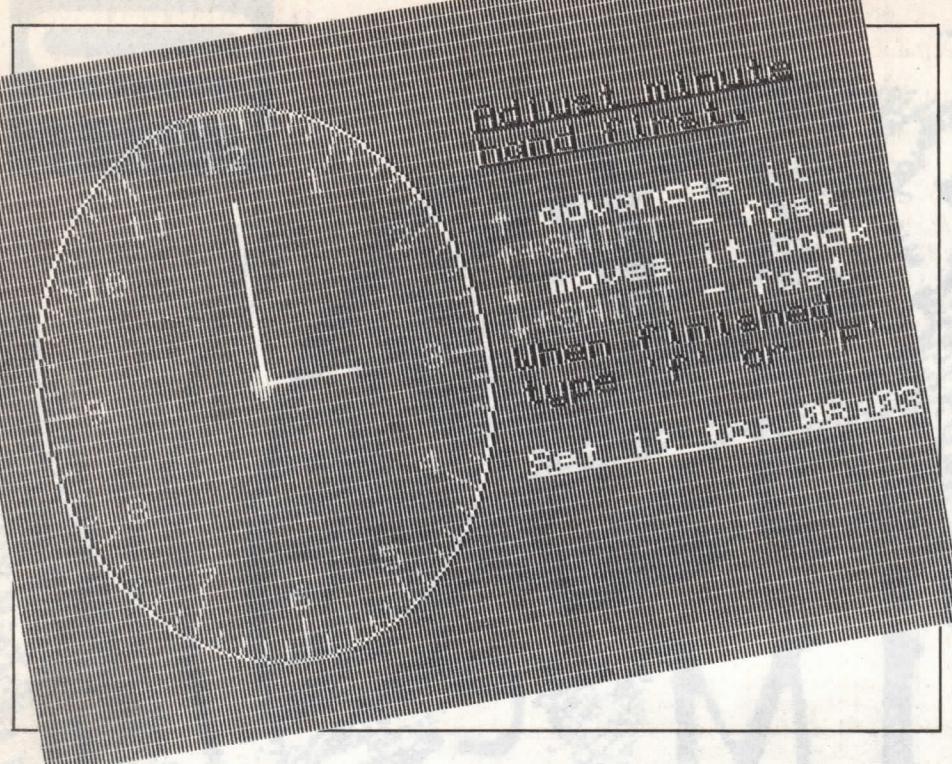
The demonstration program will enable me to say a few words about turtle graphics, since the program operates largely using the code of turtle graphics, and the full program will be available from Microdrive Exchange.

While on the subject of making plans, I feel that I should also tell you that this article concludes the current series. In future months it will take a different form — we shall publish a series of educational programs in Microdrive Exchange. No attempt will be made in

the programs to teach the reader how to write such programs, even though it is possible to acquire the correct technique by listing the programs and observing how the goals were achieved. All the programs will be written in Super-Basic, so you will have a chance of modifying them to your special needs.

I now refer to the program which is listed in this issue. Apart from a few REMarks, starting at line 100, the main body begins in line 1000. I should probably tell you that this is not by accident. I like to start programming at line 1000; it gives a more readable listing. You may have observed already that I like to use indentations in a listing and I consider them very important. If I started at, say, line 100 in steps of 10, any program of reasonable length would go well beyond line 1000. The point where it jumps from 990 to 1000 would play havoc with the indentations and, in my experience, it always occurs in the middle of a FOR....END FOR loop.

Lines 1000 to 1100 set up the screen with yellow background and ask for the user's choice. I have been running the program on a QL with a TV set and it



gave pleasing results but if you use a monitor the best choice of colours may be different.

After the user has entered a choice, line 1110 calls the procedure 'uppercase'. The purpose is to convert the user input to upper-case characters. I use many versions of Basic and Super-Basic is one of my favourites but one of its omissions is that it does not provide the user with the 'UPPER\$' function, so I had to write the procedure. Note that 'uppercase' is called with the parameter 'mixed\$'. The name is, of course, unimportant but it is very useful to be able to call a procedure or function with a named parameter.

Prompt response

The procedure runs from line 1470 to 1560 and its use is necessary because we do not know whether the user types upper- or lower-case characters in response to the prompt. In any case, we do not want to limit him to either of those cases; 'uppercase' will convert the input to capital letters. On the face of it, this seems to be a simple task; the code of any capital letter is 32 less than the code for the same lower-case letter but it would not do to subtract 32 from the code of each letter.

For instance, what would happen if the user entered a capital letter and the program subtracted 32 from its code? A reading of the listing should convince you that the program would, if the user chose to set the clock, give him the chance of reading it. A program which crashes or, even worse, carries-out the wrong type of action, is never to be accepted but it is particularly important to observe this code of conduct when writing educational programs. Our aim

must be to teach and enlighten, not to confuse the learner.

The main body of the demonstration program, starting in line 1130, is the procedure to draw the clockface. First, it defines the co-ordinates of the centre of the circle at $X=Y=50$ and the radius as 40 units and proceeds to draw the circle. Apart from those three parameters, it also defines some variables, called 'back', 'big_notch' and 'small_notch'. The names you choose are not of real importance but it is a good idea to choose meaningful names which will remind you later of the meaning of the variable.

The variable 'back' is needed to enable the program to move the turtle back to the centre of the circle, from its perimeter, without drawing a line and without having to specify each time the number of units — 40, in this case. As a general principle, constants should be held in variables, rather than typed-in as literals every time they are needed. In the current program, if I wanted to change the radius, and the value of 'back', I would have to alter line 1140 only, rather than to find and change every single occurrence of that value.

The other two variables defined in line 1160, the 'notches', refer to the lines we draw at one- and five-minute intervals on the perimeter of the clock. At the five-minute intervals we need to draw a slightly longer line.

The REPEAT...END REPEAT loop, in lines 1200 to 1290, draws those lines on the clock-face. The evaluation, of whether to draw a 'big_notch' or a small one is done in line 1220.

Having drawn all the lines of division, the next task is to produce the numbers in the proper places. In SuperBasic

there are two methods of printing at a particular point on the screen and both methods are used in this section of the program.

The 'at line, column' command is preferable, because it is easier to use but it does not give fine control of the positioning of the characters. Much more accurate control may be achieved through the use of the 'cursor x,y' command but it takes a fair amount of working-out the values. Even then, I find it is necessary to try it before finalising the command.

The procedures 'read_it' and 'set' have been included in the listing, to make sure that the program does not crash when the user makes a choice. They are replaced by two different procedures in the final program. Apart from preventing a program crash, which could have been achieved by other methods, I have included these skeleton procedures to show you a useful technique.

When you build your program from a series of previously-written procedures, functions and subroutines — called the 'top-down' method — it happens inevitably that the main program cannot call one or other of them if it is not yet available or not yet part of the listing. In such situations, it is a frequently-used and attractive proposition to replace it with a skeleton procedure, function, and so on, to enable you to try other aspects of the program.

Complete program

The complete program contains a number of procedures which might be worth examination. You do not need to know any of this to run the program but if you wish to know how it works, or perhaps you want to include some modifications of your own, here is an explanation of some of its salient features. To give you a guided tour of some features of the complete program, I shall deal separately with the procedure to set the clock and the one to read it.

Let us start with the procedure 'set'. Once the user has chosen this option, the clock is displayed, together with a message to say that the minute hand should be adjusted first and instructions are printed on how to set it. Nothing further happens until the learner presses either the up or the down arrow key, with or without shift — unless a keyboard interrupt is forced by pressing CTRL and space. The code of the key pressed is detected and the minute hand will either be advanced or retarded, one minute at a time for an arrow key and five minutes for each press if the shift key is also used.

The hands disappear momentarily and they appear re-drawn in the new position. The process is continued until

the user presses 'f' or 'F' to terminate it. No evaluation is given at this stage — only after both hands have been set. It is open to argument whether or not the setting of the minute hand should be evaluated before setting the hour hand. If you decide that it should, particularly for young and inexperienced users a careful reading through the listing will suggest the necessary modifications.

The hour hand is adjusted in the same manner; this time the arrow keys advance and retard the hand by a fraction of an hour; together with the shift key they change the current setting by one hour.

Time-sensitive

When the process of setting is completed, the program compares the required time with the time set by the user, allowing a small tolerance in the position of the hour hand, and prints the evaluation with an encouraging message, if the setting is correct. Some further tolerances are allowed. If the setting of the minute hand is only marginally wrong, by not more than two minutes either way, the message on the screen will indicate that. From an educational point of view, we must treat a totally incorrect answer in a manner different from one which is slightly inaccurate. Further, if either the hour or the minute hand is set correctly — only the setting of the other hand is incorrect — the message will again say so. An extra facility which is not part of the complete program but could, usefully, be added, is to keep a record of each process of setting, noting whether the hour or the minute hand was set incorrectly, and how often, and when the program is terminated such a message could be displayed, partly for the benefit of the learner and partly for that of the teacher.

From a programming point of view, this procedure presents a more challenging task. I mentioned in last month's article that the program must allow for various methods of entering the time. Obviously we must draw a line somewhere and it is possible to think of a method of entry which would not be accepted but the program accepts any of the following methods:

Using the words 'to' or 'past' the hour, in such a way that the words "o'clock" and 'minute' may be either present or absent.

'Quarter' or 'half' to or past the hour.

The number of hours and minutes separated by any one of the separators , ; : .

The exact hour position with the word "o'clock" appearing in the input.

In procedure `read_it`, once the input from the user has been obtained it is first separated into one of its possible forms.

If the input is 'X' or 'x', the program terminates the REPEAT loop; this input signifies that the user does not wish to have more practice at this stage. If the input contains alphanumeric characters, it is directed to procedure 'alpha' for evaluation. An input containing any of the permitted separator characters is sent to procedure 'separate' for further evaluation. Finally, if the word 'clock' appears in the input, it will be directed to procedure 'o_clock'.

In all cases, the time is converted to a format which is meaningful to the program and it is that value which is compared to the original time, determined by the computer and held in the variables `hour$` and `minute$`. The evaluation of the answer is more stringent than it is in the case of the 'set' procedure; in fact, the answer must be correct. That is reasonable, since a clock may be read with a higher degree of precision than the process of setting it.

```

100 REMark ****
110 REMark **Demonstration Program.**
120 REMark ****To draw clock-face****
130 REMark *****Leslie Fahidv*****
140 REMark *****QL Education Series*** 
150 REMark ****
1000 PAPER 6:INK 1:CLS:clock_face:RANDOMISE:CLS#0
1010 INK 0
1020 AT 3.21:PRINT"Do you want to:"
1030 AT 5.21:FLASH 1:PRINT"<S>":FLASH 0:PRINT"et the clock"
1040 AT 6.26:PRINT"or"
1050 AT 7.21:FLASH 1:PRINT"<R>":FLASH 0:PRINT"ead it?"
1060 AT 10.21:PRINT"Your choice?"
1070 REPeat loop
1080 a$=INKEY$
1090 IF a$="R" OR a$="r" OR a$="S" OR a$="s" THEN
    EXIT loop
1100 END REPeat loop
1110 mixed$=a$:uppercase mixed$
1120 IF upper$="R" THEN read_it:ELSE set
1130 DEFIne PROCedure clock_face
1140 x=50:y=50:radius=40
1150 back=-radius
1160 big_notch=6:small_notch=3
1170 CIRCLE x,y, radius
1180 angle=90:PENUP
1190 INK 2
1200 REPeat loop
1210 TURNTO angle
1220 IF angle/30=INT(angle/30) THEN MOVE radius-big_notch:
    ELSE MOVE radius-small_notch
1230 PENDOWN
1240 IF angle/30=INT(angle/30) THEN MOVE big_notch:
    ELSE MOVE small_notch
1250 PENUP
1260 MOVE back
1270 angle=angle-6
1280 IF angle=-270 THEN EXIT loop
1290 END REPeat loop
1300 AT 3.10:PRINT"12"
1310 AT 4.14:PRINT"1":AT 6.17:PRINT"2"
1320 CURSOR 210,95:PRINT"3":CURSOR 200,125:PRINT"4"
1330 CURSOR 174,150:PRINT"5":CURSOR 128,157:PRINT"6"
1340 CURSOR 87,148:PRINT"7":CURSOR 59,125:PRINT"8":CURSOR 47,95:
    PRINT"9"
1350 CURSOR 55.60:PRINT"10":CURSOR 80.45:PRINT"11"
1360 FILL 1:CIRCLE 50,50.2:FILL 0
1370 END DEFIne
1380 DEFIne PROCedure read_it
1390 CLS:RANDOMISE
1400 hours=RND(0 TO 12)
1410 minutes=RND(0 TO 59)
1420 AT 1.15:CSIZE 1,1:PRINT hours:"";minutes:CSIZE 0,0
1430 AT 10.1:PRINT"This is the ":"random time selected."
1440 END DEFIne
1450 REMark convert to upper case
1460 REMark input=mixed$, output=upper$
1470 DEFIne PROCedure uppercase(mixed$)
1480 LOCal loop,new_code
1490 IF mixed$="" THEN EXIT uppercase
1500 upper$=""
1510 FOR loop=1 TO LEN(mixed$)
1520 new_code=CODE(mixed$(loop TO loop))
1530 IF new_code>96 AND new_code<123 THEN LET new_code=
    new_code-32
1540 upper$=upper$ & CHR$(new_code)
1550 END FOR loop
1560 END DEFIne
1570 DEFIne PROCedure set
1580 read_it
1590 END DEFIne

```

T. K. COMPUTERWARE

★ Your QL Stockist ★
Telephone: 0303-81-2801

SOFTWARE:

Archiver	18.00	TechniQL	50.00
Archiver (disc)	24.00	Technikit	25.00
Cash Trader	60.00	QDraw	15.00
Finance Manager	19.00	Eye Q	29.00
Decision Maker	35.00	GraphiQL +	25.00
Entrepreneur	35.00	Viewpoint	20.00
Project Planner	29.00	Viewpoint (disc)	25.00
Home Finance (Buzz)	22.00	Concept 3D	40.00
Investment Monitor	20.00	Pro CAD 3	40.00
Integrated Accounts	100.00	The Designer	20.00
Diary	13.00	Ssign Designer	17.00
Librarian 128K	20.00	Better Basic	24.00
Ospell	25.00	Basic Ally	30.00
Spellbound (Mdv or D)	30.00	GST Macro Assembler	39.50
Archivist	30.00	Prospero Pro Pascal	92.00
QUATS	25.00	Fortran-77	92.00
Copymate	11.00	Super Forth	39.00
Cryptor	15.00	Super Media Manager (Mdv or Disc)	40.00
Touch Typist	12.00	QLoads	10.00
QUIMP	40.00	QLiberator	50.00
Key Define	10.00	Metacorno C	85.00
Sideways		Pascal	75.00
Super Sprite Generator	29.00	APL	95.00
QFLASH Ram disc & Toolkit	19.00	LISP	51.00
QFLASH Ram Eprom	25.00	BCPL	51.00
QFLASH SQB Eprom upgrade	25.00	Talent Assembler W/bench	25.00
Task Master (Mdv or D)	25.00	Cartridge Doctor	13.00
Front Page extra	38.00	Computer One Monitor	24.00
Nucleon	20.00	Assembler	30.00
Turbo Quill	15.00	Pascal	40.00
Super Toolkit 2 (Eprom)	30.00	QMON	20.00
Reconfigurable Toolkit 2	29.00	Turbo (disk)	99.00
QRAM	30.00	DevPac Development Kit	30.00
The Quill — Ad. Writer	22.00	The Editor	30.00
Prof. Astrologer + Astr	70.00	The Editor Special Edit	40.00
Front Page	23.00	War in the East	39.95
QL Switch	9.50	War in the East (Sci)	19.50
Desktop Publisher	70.00	Tankbusters	15.00
Squadrons	16.00	Karate	15.00
Chess	17.00	Blocklands	10.00
Backgammon	13.00	Droidzone	10.00
Flight Simulator	19.00	Dark Side of the Moon	16.00
Bridge Player 2	20.00	Quboids	9.00
Cosmos	14.00	Jabber	8.75
Super Astrologer	24.00	Classic Adventures	10.00
Scrabble	15.00	Dragonhold	15.00
Oxford Trivia	18.00	Wanderer 3D	20.00
Snooker	13.00	Hyperdrive	13.00
Matchpoint	14.00	Fictionary	11.50
Las Vegas	7.77	Mortville Manor	20.00
Area Radar Controller	13.00	Slime 3D	13.00
Reversi	10.00	Jungle Eddi	15.00
Strip Poker	15.00	Lost Pharaoh	15.00
Super Croupier	15.00	Caverns	11.50
Super Reversi	10.00	Heart of Gern	15.50
PRINTERS:		Centronics Printer Interface	19.50
M/Peripherals MP165	234.00	RS 232	10.00
Cannon PW 1080A	279.00	Parallel printer lead	12.50
Brother M1109	230.00	Extension parallel lead	12.50
Epson LX 86	278.00	Printer ribbons	12.50
Epson LX86 + T/Feed	300.00	phone	phone
EXPANSION BOARDS:		MODEMS	
512k Expanderam (Miracle)	99.00	Modem (Miracle)	49.50
512k Internal upgrade	94.00	Modaptor+	39.00
512k MCS board + disk I/F	199.00	Tandata QCOM	94.00
768k Trump Card with I/F	199.00	Astracom 1000	199.00
Epson expansion board	68.00		

DISK DRIVES:

Disk I/Face (Cummane)	88.25	Dual 3.5" and Triumph Card	408.00
768k Triumph Card with I/F	199.00	Single D/D 3.5" & I/F	210.00
Single DD 3.5" drive	125.00	Dual D/D 3.5" drive & I/F	295.00
Dual DD 3.5" drive	209.00	Dual 3.5" & 512k MCS	408.00

MONITORS:

Phillips 7502 + lead	98.00	KEYBOARDS:	
Phillips 7522 + lead	104.00	Schon	57.00
Tilt stand Phillips	12.00	Rainbow	85.00
Microview DC3 Colour	260.00	Schon IBM style	299.00

COMPUTERS:

QL JS 2.3 software	169.00	SOUND:	
Psion Organiser 2 CM	99.00	QL Talker	75.00
		QL Sound (ABC)	70.00
		QL 640, JS, 2,3 software	260.00
		Psion Organiser 2 XP	138.00
SUNDRIES:		QL Service Manual	20.00
10 DS/DD 3.5" discs	26.50	10 Microdrive cartridges	17.50
10 DS/DD 3.5" discs (Brand)	34.00	QL Dustcover	5.00
15 DS/DD 3.5" discs (Brand)	45.00	Cartridge Storage Box	5.50
Power Clean Filter	36.00	PSION 2.3 Software Sets	10.00
Quickshot Joystick + adapt	6.00	QDOS Companion	7.00
Keyboard Membranes	phone	Assembly Language Programming	9.00
QL Spares	115.00	Technical Guide	20.00
QEP 3 Eprom Programmer			



Taking the quantum leap.....phone

Other QL Books from £4.50 please call for titles available.

Please phone for details of other QL products in stock

All prices are in £ and include VAT and UK and mainland delivery

Telephone order payment by:

or send Cheque, Postal Orders or Eurocheque to:

**T.K. COMPUTERWARE, STONE STREET,
NORTH STANFORD, ASHFORD, KENT CT25 6DF
Telex: 966676 PMFAB G**

WDSoftware

FOR THE SINCLAIR QL:-

£15 on mdv or 5½" fip, £17 on 3½" fip

JOSS

Forget syntax errors and mistyped names in file commands! Just move a cursor and press SPACE. Cursor keys or joystick allow access to up to 8 microdrives and all the discs your interface will handle, with up to 150 files on each. Scroll & print directories, COPY, DELETE or PRINT any file, select TV or Monitor mode before LOADING/RUNNING a program. Use keyboard only to set date or label a medium. Easy to use with Psion or other software. No silly icons to learn — JOSS will tell you what it's doing! Mass copying/printing utilities and programmer's toolkit. Specify disc size, tracks and interface (CST, Cumana, PCML, MicroPeripherals) or microdrive only.

RefQL7 £11 on 2 mdvs or 1 3½" fip, £9 on 5½" fip

For use with ARCHIVE 2, contains 1300 useful references and a search/print program. Find programs, articles and reviews buried in the magazines on your shelf! Cheap updates of earlier editions.

Mdv Extension Cable (8") £5.50

Add ZX Microdrives to your QL.

Joystick Adaptor £4.99

FOR THE QL, SPECTRUM, (ALL), BBC & ELECTRON:-

WD Morse Tutor £4 cassette, £6 mdv or 5½", £8 3½"

Teach yourself to read Morse Code. From absolute beginning to 18 wpm! Feedback on screen or printer. Random letters, numbers or mixed, 100 random sentences, many helpful features include phonetic speech via Currah Micro-Speech (Spectrum). Discs unsuitable for BBC B+.

We export hardware and third-party software. Ask for lists

PAYMENT:-

In advance, in STERLING on British bank branches, international Giro, Postal Order or ACCESS/MasterCard. Add £1 outside Europe for AIRMAIL.

FROM:-

WDSoftware (QLW),

Hilltop, St Mary, Jersey, C.I. Tel: (0534) 81392



SMILING MICE

£35-£45

Using a high quality ATARI ST mouse and simple interface that plugs into the rom port on the back of the QL you can now add quality mouse control to your programs at a price you never thought possible!!! The SMILING MICE packages come complete with mouse, interface and a choice of one of three software packages full details of which can be found below. If you can't believe it (and we find it difficult to believe ourselves) why not write for further details.

MOUSE I

£35

Mouse with simple mouse routines allows full mouse control from BASIC or machine code.

COMPLETE TOOLKIT

£15 OR £20 WITH MOUSE ...

A new version of our best selling toolkit combining all the features of our old Icon, Character and Game Toolkits now contained in one easy to load module. The features include 32 fully animated sprites. Multi-tasking tunes. Definable character sets. A definable icon environment. Lots of new graphics commands including user definable fills, Screen dumps, An on screen notepad, A multi tasking print spooler and a full set of designer programs that make defining just about anything as easy as writing your name. This toolkit now includes full mouse control routines too.

COMPLETE TOOLKIT II

£20 OR £50 WITH MOUSE ...

The Complete toolkit was a hard act to follow but we think you'll have to agree we've done it!!!. This toolkit contains all of the features of the Complete toolkit, now converted to allow full machine code accessibility even to the extent of including a special version that can be incorporated into your own programs without charge. There is even a special pre-compiler program that will allow all the commands to be accessed from within compiled programs.

On top of all of these features we've added some astounding new ones, such as special new multi sized character sets far beyond QDOS can provide, with these Desktop publishing becomes a cinch. Wherever possible with this toolkit we've tried to make everything user definable — if you buy this toolkit today you'll probably never need to buy another. There is nothing like it anywhere for less than approx four times the price. If you don't believe us check it out for yourself.

ALL THE ABOVE SOFTWARE IS AVAILABLE ON MICRODRIVE OR 3.5" DISK THE PRICES GIVEN INCLUDE POSTAGE FOR THE UK FOR OVERSEAS PLEASE ADD £1. QL GOLD DISCOUNTS AVAILABLE ON PRODUCTS MARKED ***

QL GOODIES

TURBO COMPILER	£80.00	SUPERCHARGE	£42.00
THE EDITOR	£26.00	SUPER SPRITE GEN	£26.00
ICE WITH MOUSE	£63.00	SCHON KEYBOARD	£53.00
CENTRONICS INTERFACE	£17.00	512K EXPANDERAM	£80.00
QL MODEM	£45.00	QMS400 SOUND BRD	£50.00
ATARI 520STFM	£360	ATARI 1040STF	£550

P+P included for UK Sorry QL GOODIES are for U.K. only.

Allow 14 working days for delivery.

Over 400 QL and ST Goodies all at Smiling prices available now!

Send Cheques/PO/Giros or Write for further details to:-

SMILING SOFTWARE 10 FIR ROAD, MARPLE, STOCKPORT, SK6 7QN

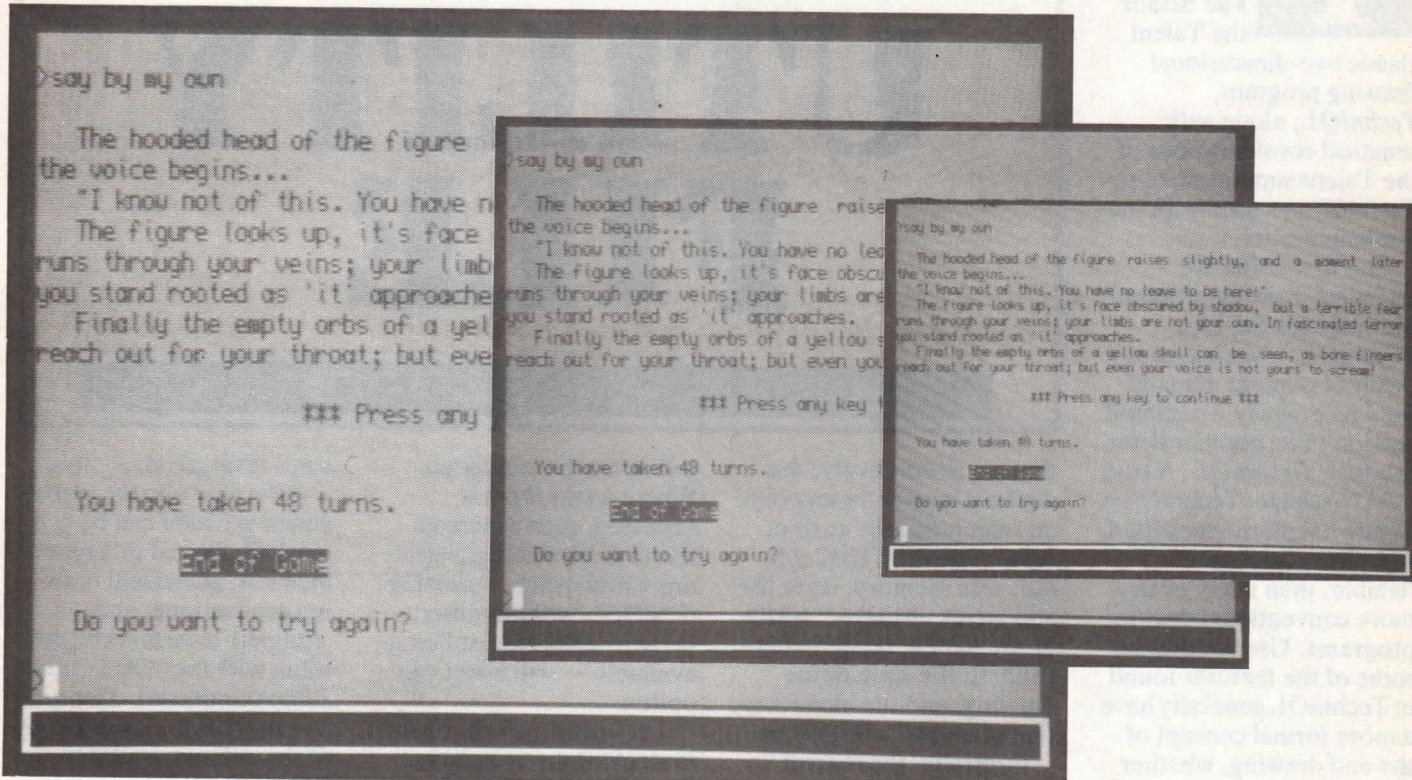
DEALER ENQUIRIES WELCOME ALL TRADEMARKS ACKNOWLEDGED



452 761 8

SOFTWARE FILE

Charles Gerrard wanders into the mythical world of Gern, a powerful evil spirit in wolf's clothing



The Heart Of Gern

PCBS
£15.50

When Gilsoft released its Quill Adventure Writing System for the QL, *Sinclair QL World* predicted, or at least hoped, that it would provide the vehicle for many new QL text adventures. *The Heart Of Gern* from PCBS is the first of such games written with the aid of Quill. If those which follow it maintain an equally high standard, QL adventurers will have much to anticipate.

The scenario will be familiar to those well acquainted with the adventure genre. The mythical Princelands are the scene of a battle between the forces of good and evil. On the right side is our hero and the main character in the game, Tirac, played by you. The baddies

in the plot are the Brotherhood, religious followers of the wolf-god Fenris.

The major pre-occupation of the Brotherhood is to recover the Heart Of Gern. Gern is, or was, a spirit wolf, a powerful evil spirit inhabiting the body of a large wolf. He is supposed to be dead but his spirit was saved by Yandross, a particularly evil and clever member of the Brotherhood.

Yandross trapped Gern's spirit in a spherical black jewel, the Heart Of Gern, and hid it in a secret vault; now the Brotherhood is on the way to thaw him out. Having a spirit wolf on the loose is not a prospect Tirac et al view with much relish. The only solution is to reach the vault first and swipe The Heart from under the nose of the Brotherhood.

Fortunately the Brother-

hood has no monopoly on religious mysticism and magical powers. Tirac is a follower of the Church Of Light. Membership entitles him to a free sundisc which shines in the dark and recourse to psuedo-religious exclamations such as 'sun in heaven!' and 'name of the day!'.

Tirac's quest begins at the entrance to the secret vault. Its whereabouts has been revealed to him by Besac, whose search for The Heart was concluded prematurely when he was attacked by a pack of great wolves. You can learn this and other details from the accompanying literature, which includes an illustrated introduction to the story.

Once inside the vault you are on your own. The usual rules of adventure gaming apply. It pays to look round

and examine as much as you can before making your move. The most helpful advice is to use your grey matter. There is always some small clue which will give you the key to overcoming specific problems.

A pleasant feature of the game is that, unlike far too many adventures, you will not find yourself in a useless dead-end having played for several hours and overcome countless virtually impassable obstacles. Gern is more than a maze; the challenge is to overcome each tricky situation as it arises. If you really cannot work it out, PCBS will provide a few useful clues but cheating in that fashion must be a last resort. Finally, if you buy the game and I recommend it, if you find how to get past the hooded guard I would appreciate a line.

Talent scores with CAD plotting packages

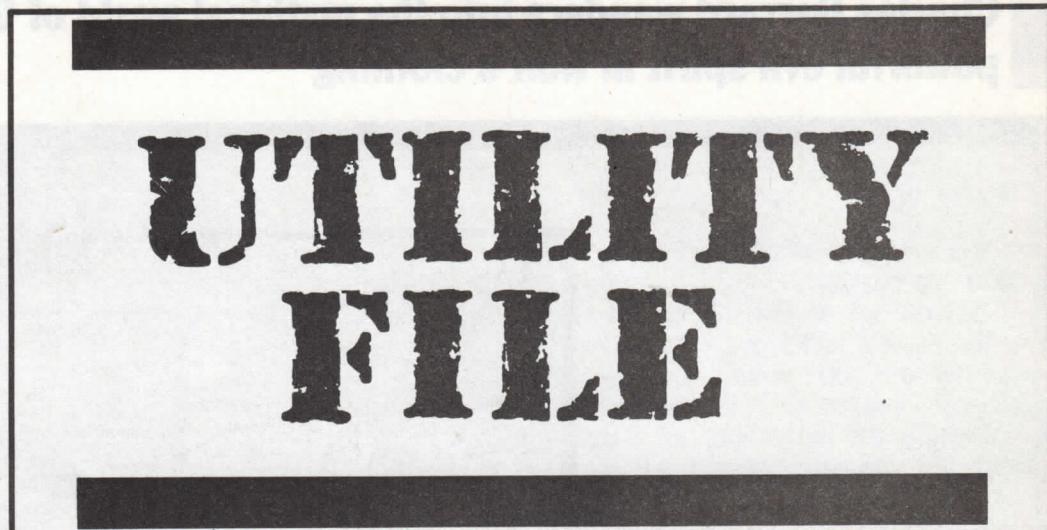
This month's instalment of Utility File details the Talent classic two-dimensional drawing program, *TechniQL*, along with practical considerations of the Talent support system, *TechniKit*, as used with the Penman plotter.

The first definitive technical drawing program available for the QL, *TechniQL* was released as a result of popular demand for a technically-orientated version of its popular sister product, *GraphiQL*. A true CAD package, *TechniQL* is somewhat more specialised, and inherently more flexible, than many of the more conventional drawing programs. Users requiring some of the features found in *TechniQL* generally have a more formal concept of the end drawing, whether for use with a flowchart, packaging design, technical plans or diagrams of any nature.

Making the transition from *GraphiQL*, a solely MODE 8 program, to *TechniQL*, usable in either mode, has been facilitated by adopting a similar user interface in the latter; commands may be input either by selecting them from one of five menus, available by pressing **F1** to **F5**, or by using a two-letter input code.

Once started, the *TechniQL* screen displays a range of information. The largest area, the viewing port, is the drawing area. Three windows to the right of the drawing area provide system information.

The upper of the windows displays the current drawing status — cursor X/Y posi-



tion or, alternatively, the distance between a set point on screen and the current cursor position; INK colour, free memory, layer list and layers displayed; width of the screen, related effectively to the scale of the drawing; and the identification of the cell being edited.

Centrally, the second window displays information periodically concerning various objects in a cell. At the bottom of the information panel a third window displays instructions and system prompts.

The input of commands generally have two additional keys associated with them; pressing **SPACE** will accept the product of a command; pressing **ESC**

will abort the command. Where a text input is expected, such as screen text or a drive access, inputting a null string — pressing **ENTER** without other, perhaps default, text being available — will abort this option.

The cursor can be moved in single steps or in units related to the size of the optional grid. If the grid-related movement is on **SNAP**, pressing **CTRL** and an arrow key will move the cursor in increments of three steps; **SHIFT** and an arrow key will move the cursor eight steps. If the SNAP option is off, using an arrow key with **SHIFT** and **CTRL** will move the cursor in 32 and eight pixel

steps respectively.

Alternatively, the current cursor position can be marked, moved to a new location, additional drawing can be done, and 'Jumped' to its marked position, with the "CJ" (Cursor Jump) command. The cursor may be displayed in any of the colours available from the extensive palette. When selected, the grid is also displayed in the current cursor colour.

With the exception of arcs, drawing with *TechniQL* is done with rubber-banding. Rather than the conventional continuous drawing, as utilised by most graphics programs, line drawing occurs by steps after selecting the polygon option; alternatively, single lines can be drawn from the current position of the cursor to a new position on-screen.

Employing a form of scale command, *TechniQL* provides a system for making very large, detailed drawings, occupying more than the size of a single screen. Once work on any given area of the screen is completed, the cursor can be moved to a new location

Information

Product: *TechniQL*

Price: £49.95

Product: *TechniKit*

Price: £24.95

Source: Talent Computer Systems, Curran Building, 101 St. James Road, Glasgow G4 0NS. Tel: 041 552 2128.

Product: Penman Plotter

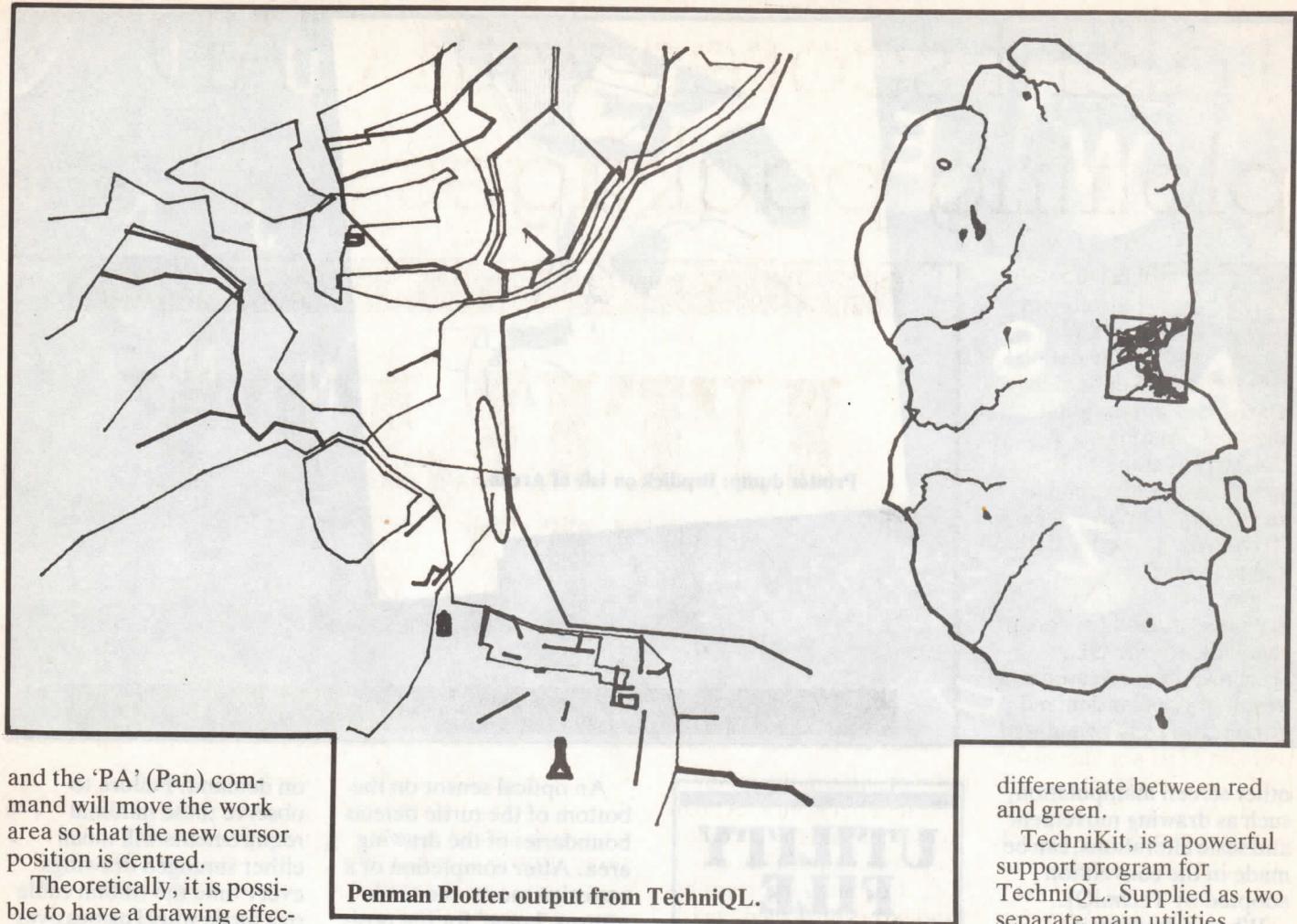
Price: £249

Source: Penman Products Ltd, 8 Hazelwood Close, Dominion Way, Worthing, Sussex BN14 8NP. Tel: 0903 209081

Product: Serial printer lead, with 25-pin D connector.

Price: £10.

Source: Transform Ltd, 24 West Oak, Beckenham, Kent BR3 2EZ. Tel: 01-658 6350.



and the 'PA' (Pan) command will move the work area so that the new cursor position is centred.

Theoretically, it is possible to have a drawing effectively 65,535 pixels wide. Zooming in or out of a given area, centred on the cursor position, permits the user access to either an overview or the fine details of a drawing.

Having the facility to draw in cells is a powerful feature. Once a cell is drawn, a transistor symbol for example, it can be planted in a circuit diagram and, where necessary, transformed in one of several orientations — normal, mirrored vertically, mirrored horizontally or rotated anti-clockwise by 90 degrees. Cells can be nested to a depth of nine, providing a system for building complex combinations of similar symbols from basic elements.

Libraries of cells can be created by the user and may represent repetitive shapes or symbols, including fonts and icons, for use with virtually any specialist form of computer graphics. Those cells may be super-imposed

Penman Plotter output from TechniQL.

upon each other and can be viewed collectively or singly.

Two other exceptional features are that the system does not utilise QL fonts for screen characters, enabling users to manipulate text in a drawing. An initial character font is included with the drawing package, which can be modified or added to.

Although new fonts can be created in TechniQL by using its ability to produce elements of a drawing within separate cells, *TechniFont*, part of the TechniKit utility, provides a more comprehensive facility for producing a wide range of fonts and symbols.

TechniQL arcs utilise Bezier curves, avoiding problems associated with the Qdos ARC facility. To draw an arc is a two-stage process; up to four points are first marked on-screen, using the 'CM' (Cursor Mark) command. The second command, 'CURVE',

is selected from the <F5> menu and a curved line will be drawn between the first and last of the points defined, with the two intermediate points influencing the shape of the curve.

Although somewhat more long-winded than the SuperBasic equivalent, the TechniQL method of drawing arcs is more flexible and is also consistent with other advanced features in the package.

An important consideration is that the TechniQL drawing files are not conventional screen dumps and are very compact. The demonstration screen, the Isle of Arran, with its overlay of Brodick, takes 7.5K of file space.

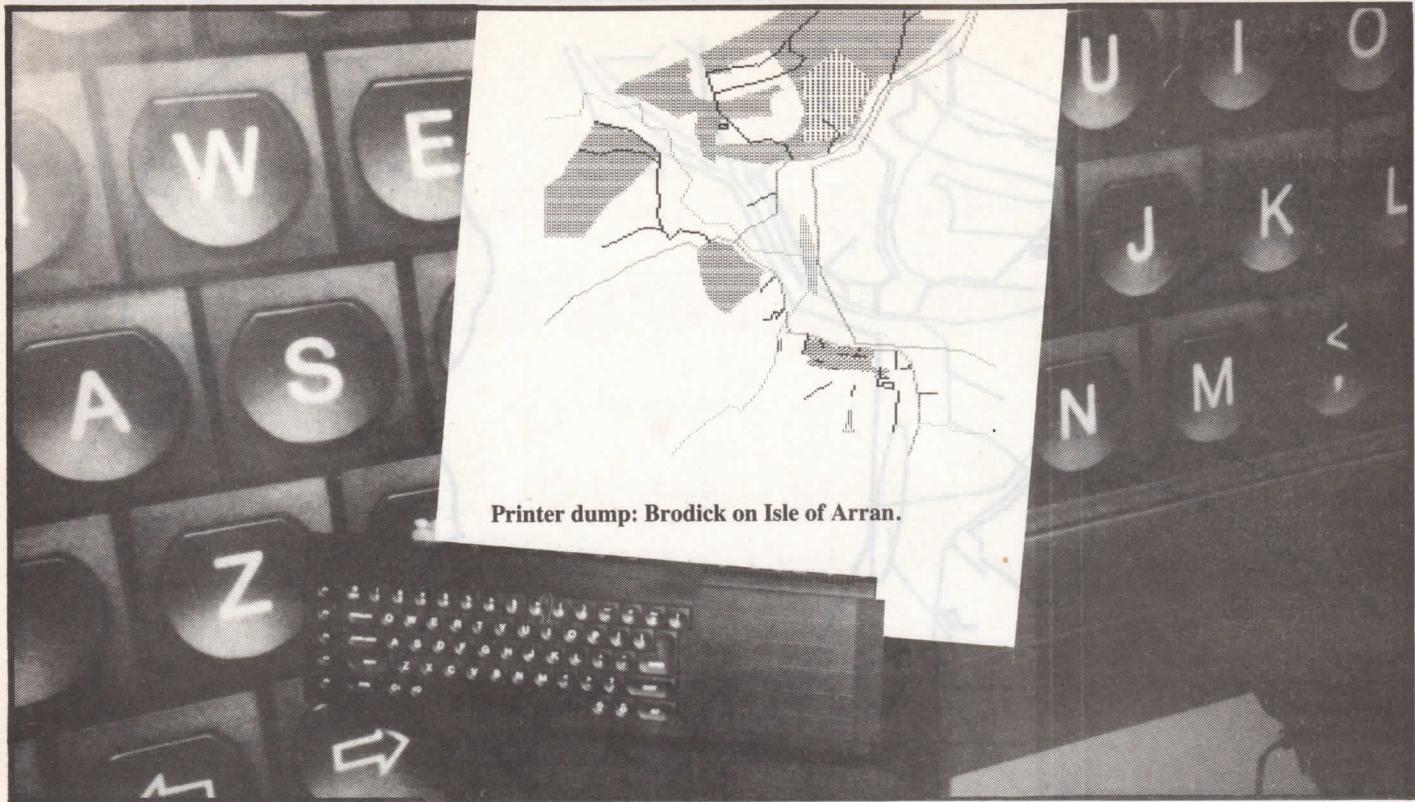
The TechniQL screen dump for dot matrix printers is one of the most accurate available. Circles are represented as circles and show none of the eccentricity common in many graphic printer drivers. It does not

differentiate between red and green.

TechniKit, is a powerful support program for TechniQL. Supplied as two separate main utilities, TechniFont provides a facility for producing groups of fonts or symbols; TechniPlot is a collection of three plotter driver programs — a driver for the Silver Reed Colour Pengraph; a general-purpose screen plotter, for adaptation to existing plotter driver programs; and a dedicated plotter driver for the Penman.

To use the Penman driver, the file Plotter must be deleted from the back-up cartridge and the file Penman copied to the same device, with the new name Plotter. Alternatively, if a toolkit supporting RE-NAMING is available, the respective files can be changed appropriately.

TechniPlot loads two SuperBasic routines, used by the plotter driver, and a cut-down version of TechniQL which differs from the main drawing system mainly in that there are no facilities for making additions to a drawing;



Printer dump: Brodick on Isle of Arran.

other screen manipulation, such as drawing movement and scale alterations, can be made in the convention adopted by TechniQL.

When a drawing is loaded, it is drawn in the default screen width of 256 units. Entering 'ZO' (Zoom Out), decreases the size of the drawing one-and-a-half times for each entry. Zooming in is done by first positioning the cursor in the upper left or lower right corners, moving the cursor to the diagonally opposite corner and pressing <SPACE>. The screen will clear and be re-drawn at the new scale.

TechniPlot has an extensively modified 'PD' (Printer Dump) command. Rather than resulting in the standard line dump, used by dot matrix printers, 'PD' calls the SuperBasic subroutines loaded along with the modified TechniQL drawing handler. These translate high-level — Basic — commands into low-level plotter instructions.

Those instructions are converted into 'Draw a Line', 'Draw a Circle', and so on. Some plotters have text modes in addition to

UTILITY FILE

their ability to draw lines. Where text modes are not implemented in the plotter's repertoire in the same way as text is treated line and arc segments.

The Penman differs from conventional table or platen plotters mainly by incorporating three pens, a drive motor system and an optical sensor in a turtle-type carrier head, connected to the main body of the controller unit by a ribbon cable. Except for this umbilical cord, the head moves as an independent entity over the sheet of paper, which is held in position on a black plastic sheet with tape.

The controller unit, connected to the QL by a serial link to the ser1 port, keeps track of the QL commands, the turtle position and current status. Data is transferred between turtle and controller for pen position, pen selection and current direction of travel.

An optical sensor on the bottom of the turtle detects boundaries of the drawing area. After completion of a cartesian move, the turtle returns 'home' for the position of its left and bottom boundaries. During changes of pen, the turtle pauses and then displaces its position by the distance separating the pens in their holders.

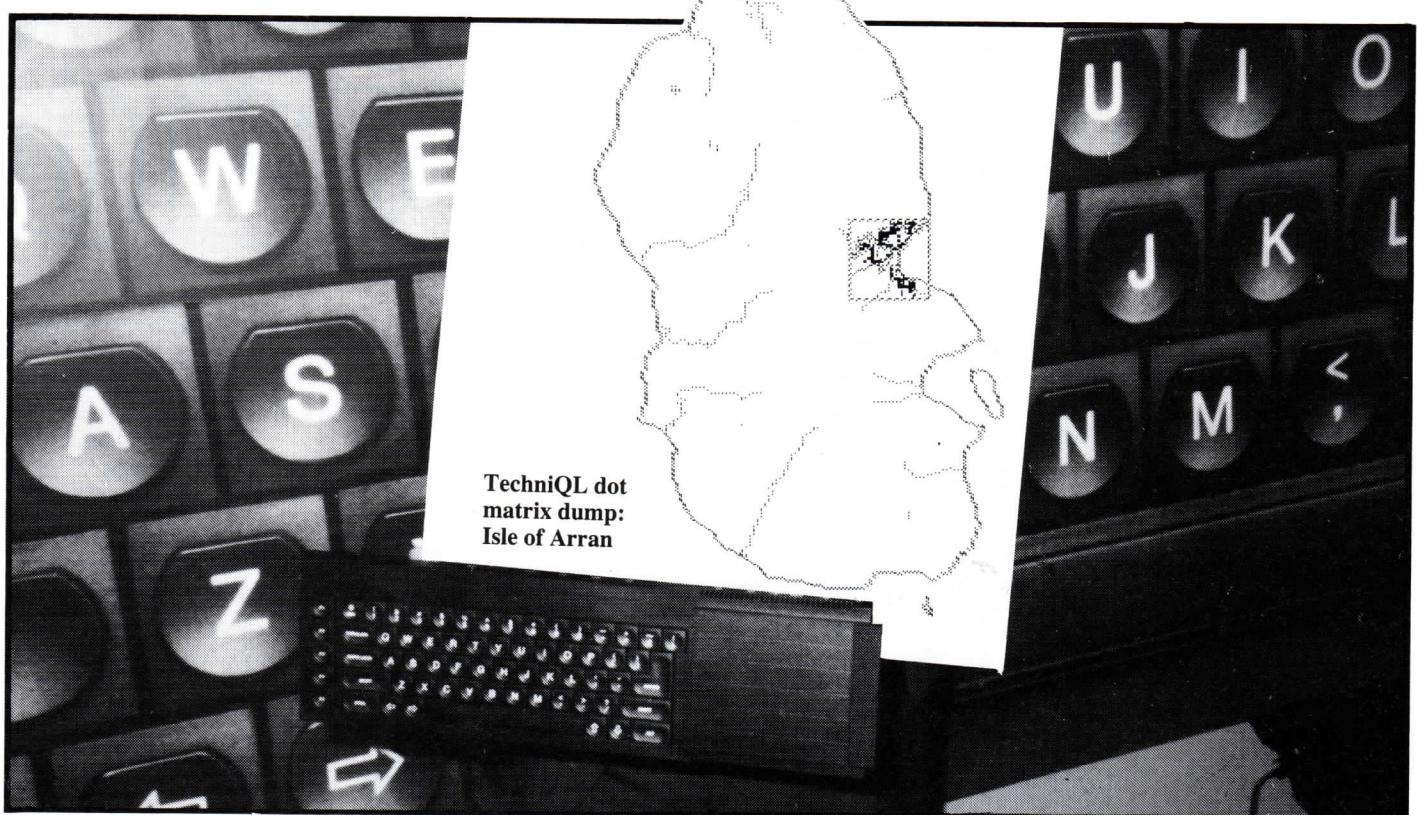
The Penman turtle will accept a range of drawing implements which include pencils, capillary and felt-tip pens but a number of precautions should be observed when selecting ink pens as drawing implements. Although special fast-drying, water-based red, blue, green and black pens are included with the unit, pen adaptors allow you to use any of several proprietary brands of fine-point, felt-tip pens, such as those produced by Pentel.

Care must be exercised when using pens with alcohol-based ink; there is a tendency for the ink to dry too quickly and, unless plotting is to start immediately on installing the pens, it is likely that the nibs will be too dry to distribute the ink

on demand. Failure to observe these minimal requirements will mean either smudged drawings every time the ribbon cable or a turtle wheel passes over a recently-drawn line, or a failure to plot whole sections of a drawing. Because of the method used to move the pens to their required positions, a number of minor positioning inaccuracies are almost inevitable.

Motion of the turtle wheels is monitored by the method used by a mouse, with photosensors. The turtle sensors can detect a rotation of the shaft of the wheel corresponding to a linear movement of 0.07mm. — resulting in a possible position error of plus or minus 0.07mm. in 45mm. of linear travel.

Another source for positional discrepancies is caused by wheel slippage occurring in a direction parallel to the motion of the wheels, due in part to the acceleration of the drive motors. Frequent updating of the turtle position, after a sequence of moves, by the return of the turtle to its 'home' position prevents



position errors accumulating and keeps them to a minimum.

As supplied, the Penman is complete with plotter unit, a range of pen colours, paper and a comprehensive manual. Because it is sold for use with a wide range of computers, the kit does not include a serial printer lead, which must be obtained separately.

Transform can supply the lead, 6ft long, with suitable plugs for the QL ser1 port and a 25-pin D connector at

a modest price. After a considerable amount of cross-testing, the only possible conclusion I can reach is that TechniQL, TechniFont and the Penman plotter are a very powerful team.

Applications for TechniQL and its support program TechniKit are wide-ranging; whether for really useful technical drawings, graphic arts — such as letterheads, packaging or labels, to mention a few — flowcharts or any form of diagrammatic representa-

tion, the program copes very well. Being more specialised than conventional drawing programs, TechniQL lays the burden of pre-planning and organisation on the user.

I liked the Penman. Without reservation, it is a superb, moderately-priced plotter; it does what it is designed to do and does so very well, by providing facilities seen on plotters costing considerably more.

Minor inaccuracies of the Penman can be tolerated by

all but the most demanding drawing requirements. It is certainly capable of dealing admirably with any type of reproduction of which the QL is capable.

Where a greater degree of accuracy is required, users can modify the Super-Basic utility supplied by Talent, TechniPlot, so that it calls for a 'home' check more often. While that may slow drawing somewhat, it further minimises the possibility of inaccuracies in reproduction.

Update on CP/M emulator for QL

Within a few days of the CPMulator report being completed for the June issue, more exciting news was received of latest developments from Arnie Gardener at Sandy U.K.

Having acquired worldwide distribution rights, Sandy says its official release version of the CP/M emulator incorporates modifications to the original program system which increases its speed considerably.

UTILITY FILE

The review version of the CPMulator EPROM took about 4K of space; the release version of the EPROM is just short of the full 16K capacity and provides significant improvements.

Most notable is the

WordStar character handling speed in the QL environment. When the package was tested originally it was possible for a reasonably fast typist to get well ahead of WordStar character input on-screen; the release version has improved screen-handling to a point where character handling lags only slightly behind that of a fast typist.

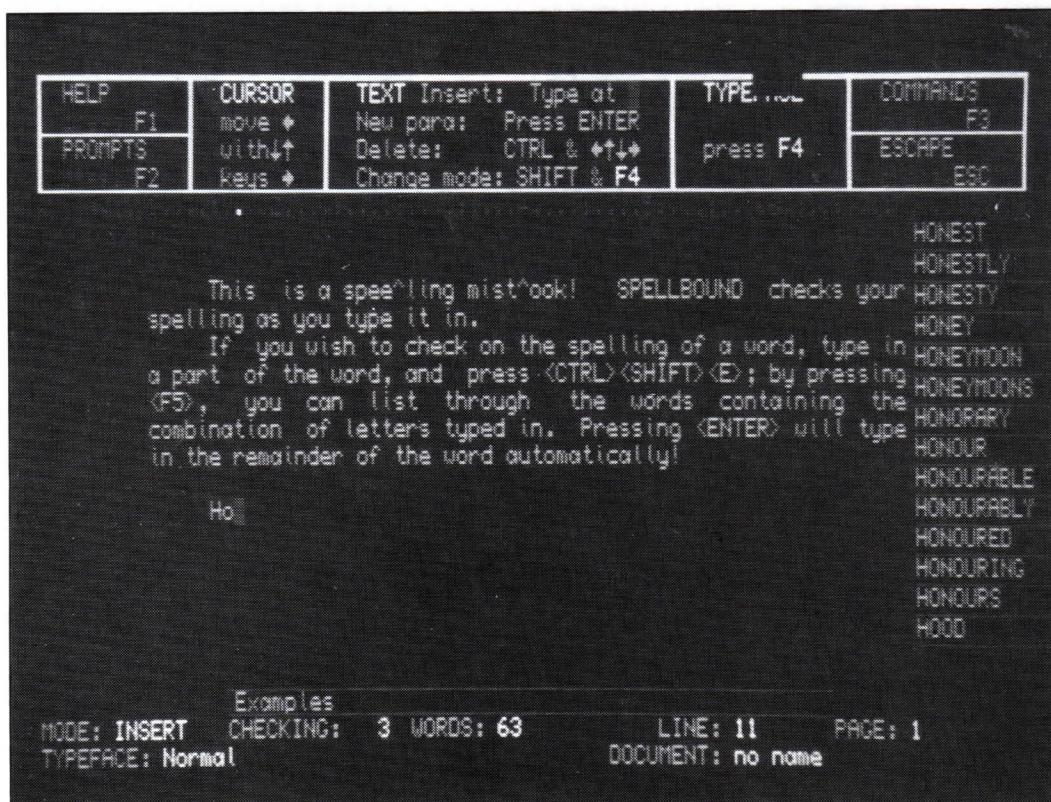
It must be stressed that any speed loss experienced in CP/M programs run on

the QL is due to the display handling and not to program processing. As a practical demonstration, a *Sieve of Eratosthenes*, compiled with Borland Turbo Pascal, was run and obtained 1,899 prime numbers in slightly more than three seconds.

Modifications have also been made to the emulator's RDCPM utility, improving the transfer of programs from original CP/M volumes to the CP/M format somewhat easier.

Spellbound

If the shorter Oxford English Dictionary and TV programmes like Call My Bluff are your bag, read this



Product: Spellbound

Price: £29.95

Source: Sector Software,
39 Wray Crescent, Ulles
Walton, Leyland, Lancashire
PR5 3NA. Tel: 0772
454328.

It seems to matter little how literary-minded anyone is. We all have moments when the correct spelling of a word eludes us. If you are tired of documents containing spelling mistakes or hunting frantically in a conventional dictionary, the Sector Software *Spellbound* could be the answer for you.

The first QL spelling checker, Qspell, released by Eidersoft in the early days of the QL, provides a 25,000 supplied vocabulary and is

expandable by a maximum of 1,000 additional words. A completed document, filtered in its Quill doc form through the Qspell system, can be flagged optionally for any errors found and subsequently corrected, after re-loading it into Quill.

Unlike Qspell, from which a part of the massive Spellbound 30,000-plus word vocabulary database has been derived, spelling is checked while it is being typed-in and users have several options available for indicating errant or elusive words.

Monitoring

Consistent with other Sector business-orientated software, using Spellbound

could not be easier. It can be loaded with its own boot or its loading can be called from within the boot of any program requiring spelling monitoring and loaded with, as an obvious example, Quill.

Most Spellbound work occurs unseen by the user. Command keys have been kept deliberately to a minimum and provide more than adequately all of the facilities or prompt permutations required.

- (CTRL) Delete an existing & (D) — word.
- (CTRL) Examine the vo- & (E) — cabulary list for the letters entered up to any given point.
- (CTRL) Switches on Spell- & (O) — bound.

- (CTRL) Put a new word into & (P) — the dictionary.
- (CTRL) Write a dictionary & (W) — containing new words added in subsequent sessions.

Switching off Spellbound or its WRITE command is done by using any cursor movement, besides (CTRL) & (LEFT), or the (F3) or (F4) command entry options. Five levels of incorrect spelling indication are available:

- (CTRL) Minimum level of & (1) — prompting — visual prompt only.
- (CTRL) Visual and audible & (2) — warning of a mis-spelling.
- (CTRL) (default) Visual, & (3) — audible and inserts "" where the spelling departs from words available to the dictionary vocabulary.
- (CTRL) Visual, audible and & (4) — a momentary pause at the point where a word departs from its expected spelling but allows you to continue.
- (CTRL) Visual and audible & (5) — warning. Also inserts the "" into the errant word and refuses further input until deliberate corrective action is taken.

rl1 When Spellbound is activated in Quill, its presence is announced between Quill "MODE" and "WORDS" messages with the message "SPELLBOUND" and the level number of the prompt. As words are typed, the message is changed briefly to "CHECKING" and reverts to the original message when (SPACE) or a punctuation mark is input. It is as fast as that; no discernible loss in

typing speed can be detected.

If you are looking for the spelling of a particular range of words included in the Spellbound vocabulary, switch on Spellbound and type the portion of the word needed to narrow the range of words to those containing only the combination of letters for which you are searching.

Entering "PARAL" and pressing (CTRL) — (E) (for Examine) opens the vocabulary window, 17 rows of 11 characters, to the right of the screen, produces a list of eight words — unless you have added more — from "parallel" to "paralysis".

Window

Typing the letter "P" and (CTRL) & (E) will list all the words beginning with "P" in the vocabulary window; if the list is too long to be shown in its entirety, pressing (F5) will continue with the listing to its completion.

As additional letters are typed for any given word and

the (CTRL) & (E) command keys are pressed, fewer words are included in the list until, finally, the only words contained in the list are the typed word and, possibly, its derivatives.

Words requiring an upper-case first letter are indicated in the dictionary with a white first letter. All other words, indicated completely in green, are acceptable in either case. Entering such words you are offered the option of having them checked only in their upper-case form or not.

Users have the option of loading or saving either the default dictionary or as different sets of spelling files for particular specialised applications. Consideration of the monumental task carried-out by Spellbound is truly mind-boggling. As successive letters are entered for each word, it must search its vocabulary data and, if a match is not found, action is taken to alert the user.

Adding words to Spellbound comes naturally.

As you type, words being entered are checked for spelling and availability. If a word is not in the dictionary, Spellbound assumes that the word is typed incorrectly and a "Not found" message is output.

Derivatives

You then have the option either of adding the unknown word to the dictionary or ignoring the warning. By pressing (CTRL) & (P) the word stack is lifted at the point where the word must be inserted, the new word is added to the vocabulary and you continue as before.

The choice of adding the derivatives of a particular word — singular or plural forms and tenses — or waiting until you have an occasion to use them is up to you. After spending a considerable time evaluating Spellbound, I concluded that Sector should also include a warning of the Government health type to the user. With the best will in the world, it would have

been impossible to include all of even the most common words used by everyone. It is a distinct temptation in idle moments to type-in the odd few words to see if one can find a word not already among its already massive collection. Even more tempting is the inclination to add every word you encounter.

The only limitation is the amount of memory available to its users. If you succumb to the temptation mentioned and/or if you are interested in phrases such as pusillanimous machiavellianism, you could eventually have a problem with a memory shortage.

The Sector Software sister product, *Taskmaster*, was described in a recent review as the Rolls-Royce of the multi-taskers. In the same vein Spellbound must be described similarly but with some of the attributes of a Maserati. If you try to cross a Maserati with a Rolls-Royce, you can easily become spellbound.

RELEASE THE POWER OF THE QL

QLC £99.95 inc VAT

A professional specification C compiler for the QL. Designed by LATTICE®. QLC is the most powerful and complete C compiler available for the QL.
► Complete Kernighan and Ritchie implementation. ► Full floating point arithmetic. ► Comprehensive library of UNIX and QDOS functions.
► Separate compilation. Linker. ► Powerful data types (inc. structures and arrays). ► Macros and conditional compilation. ► Over 90 detailed error messages.

ASSEMBLER

£39.95 inc VAT

The best selling macro assembler for the QL.

► Full Motorola 68000 specification ► Macro expansions. ► Linker, directives, conditional assembly, and many other professional features.

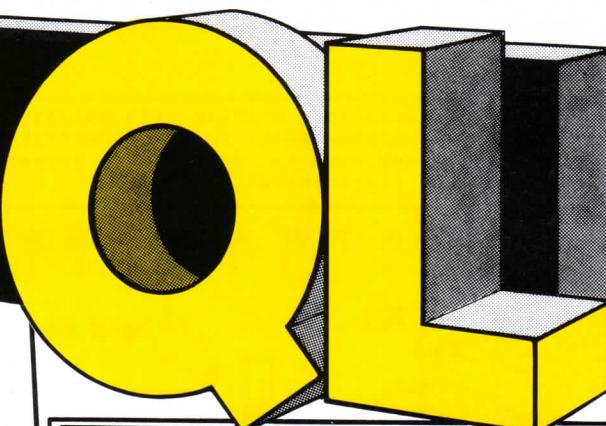
QL PASCAL

-NEW VERSION-

£89.95 inc VAT

A full ISO standard Pascal compiler.

► Fast, single pass Pascal compiler ► Complete implementation of the ISO 7185 Pascal standard. ► Generated native code. Can be linked to assembler modules. ► Comprehensive error handling. ► Easy interfaces to QL features.



BCPL

£59.95 inc VAT

A true compiler. Ideal for systems programming-utilities, games, and applications.

LISP

£59.95 inc VAT

LISP interpreter for exploring 'the language of artificial intelligence', with graphics.

QL APL

£99.95 inc VAT

Keyword and Symbolic versions of this powerful APL interpreter by Micro APL. All standard APL facilities implemented with no restrictions and many extra features.

METACOMCO

26 Portland Square, Bristol BS2 8RZ

Tel: Bristol (0272) 428781

In the USA call 1-800-252-6382

Trademarks: UNIX-AT&T Bell Laboratories, QL, QDOS—Sinclair Research Limited.

Prices include VAT, postage and packaging UK mainland only. Delivery, allow up to 28 days.

Phone today or post this coupon to:
Metacomco, 26 Portland Square, Bristol BS2 8RZ.

I enclose a cheque for £_____ or debit my ACCESS/VISA

No: _____ CARD EXPIRY DATE _____

NAME: _____

ADDRESS: _____

POSTCODE: _____

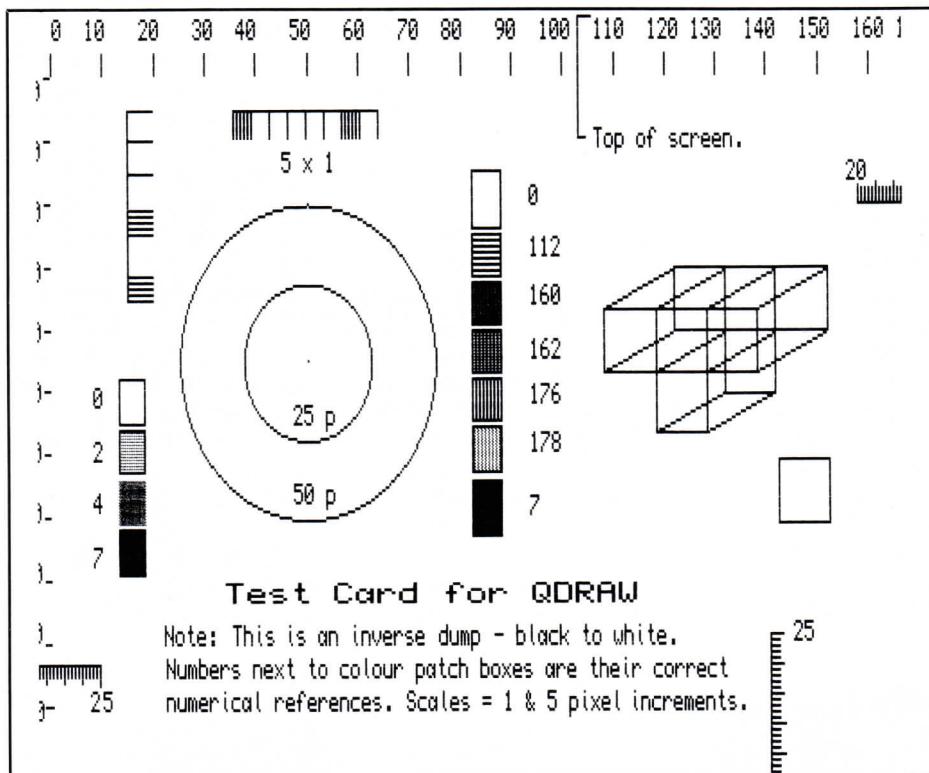
SIGNATURE: _____

TEL: _____

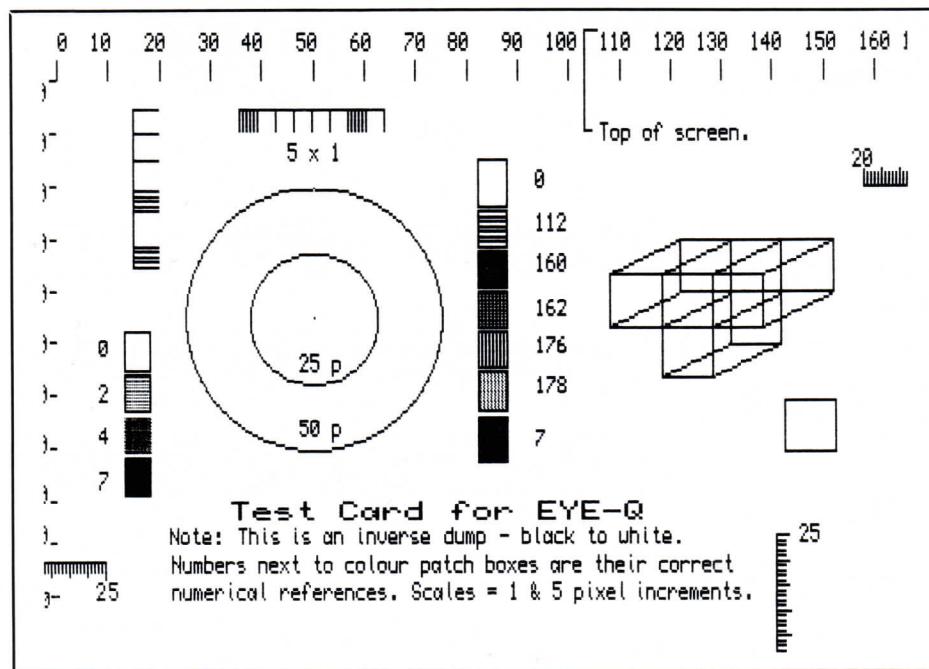
Please send me:

- Assembler £39.95
- LISP £59.95
- BCPL £59.95
- QLC £99.95
- QL PASCAL £89.95
- QL APL (Keyword) £99.95
- QL APL (Symbolic) £99.95
- More information

Give your printer big graphics appeal



QDRAW's dump demonstrates the problem with making a compromise between vertical pixel measurements in their correct relationship and drawing circles and squares in correct proportion. Colour representation is well represented.



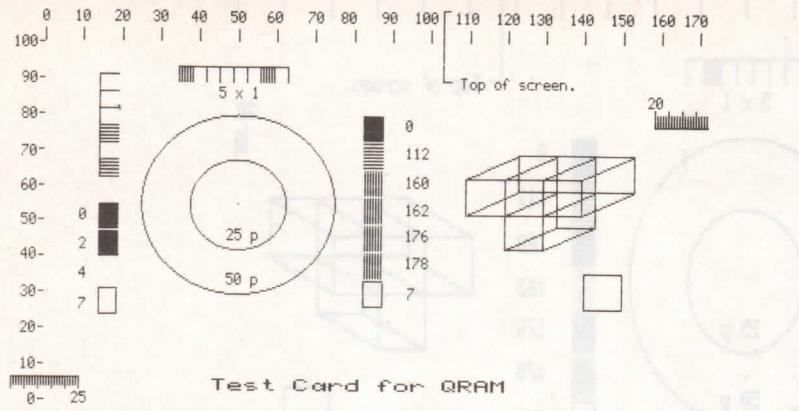
This dump, made from the EYE-Q utility, has been optimised for circles for the Canon PW1080A printer. Some compression has occurred in the vertical scales because of the line feed requirements. Also, clipping has occurred at the bottom of the page (two pixels); the left side of the page (eight pixels) and the right side of the screen (eight pixels).

Ron Massey dips his finger into the stunning array of rainbow colours available on printers and plotters

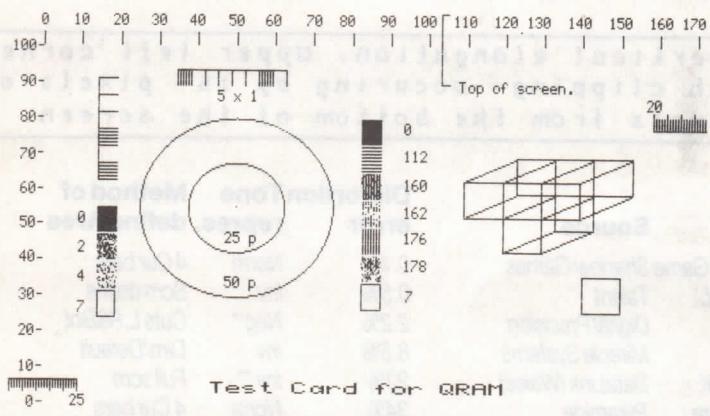
Using dot matrix printers to obtain hard copy from a screen image is only one of several ways to make permanent copies. The majority of graphics programs incorporate routines for producing black and white prints using a dot matrix printer. Additionally, a few dedicated printer driver programs are available which offer special features, such as re-configuration facilities for non-Epson-compatible printers and facilities for re-defining monochrome representation of colours and stiples.

Monochrome printing, like its photographic counterpart, is often more difficult than reproducing colour. If for no other reason, monochrome requires that each colour, tone and stipple, be readily identifiable as an individual step in a tone scale.

When a printer dump program is written, a number of options must be considered, almost always resulting in a number of compromises:



Test Card for QRAM



Test Card for QRAM

The top dump is a standard QRAM dump. The lower dump has had the "RANDOM" option selected in order to emphasize the difference between red and green. Three of these dumps will fit on an A4 page.

- a. Distortion — the ability to reproduce a screen circle as a printed circle;
- b. Colour representation — translation of the range of colours into distinct representative tones on a grey scale;
- c. Dumps should be as universal as possible, which means that, in practice, they are usually produced for use with Epson-compatible printers;
- d. Variables encountered with printer hardware:

1. Either 7-, 8- or 9-wire printing heads;

2. A range of control codes used by different models of printers, as well as baud rates, line spacing and whether the most significant bits in each byte of data appear at the top or the bottom of the printhead;

3. cater for printers which offer a range of graphic modes.

Generally, printer dumps may work in one of two ways:

- a. Horizontally on a vertical sheet of paper, in the same orientation as on the screen. They sometimes produce one pixel per dot translation.

- b. Vertically on a vertical sheet of paper by translating bytes from a column on either the left- or right-hand side of the screen.

Many programs utilise special features such as allowing the user to select the screen area which will be passed to the printer; others, such as the Tasman *Tas-copy*, provide a separate operating system for customising their printer driver for individual printer types, as well as the option for re-define the monochrome translation of the colours.

TechniQL took on exceptional approach in its printer driver by giving the user the option of selecting both the area to be printed and to select the size the drawing is to occupy in the screen area. One of the most common compromises utilised in dump routines, to obtain the best possible fidelity, restricts the screen area available for printing.

The TechniQL and Shadow Games printer dumps achieve maximum possible accuracy by maintaining a strict mathematical ratio of height to width. TechniQL does it by printing a user-

defined area within the square "viewing port" of the screen. The Eye-Q printer dump minimises distortion by controlling the graphics mode line-feed, which can cause a certain amount of printing overlap.

Taking an entirely different approach, the Shadow Games printer dump, displaying the most accurate reproduction of the 14 dumps reviewed, will print a maximum screen area of about 440 x 200 pixels, corresponding roughly to the TV-sized window, over virtually an entire A4 sheet of paper.

Describing the design requirements of a printer dump, Allan Ovens of Shadow Games says: "To obtain strict accuracy, a full screen print will exceed the length of A4 paper. That is a restriction imposed by the physical characteristics of printers. Printer driver options available either will produce a distorting dump routine, require longer than A4 paper or reduce the relative size of the screen area available for the printer."

He adds: "Printer heads produce dots which are usually 1/72in. in diameter. A mechanical limitation forced on an accurate printer driver in high resolution, for example, requires a minimum possible vertical — on the printer, but horizontal on the screen — size of two print dots per screen pixel, so as to allow enough variation for shading.

"The horizontal — on the printer, but vertical on the screen — print size of each pixel can be varied much more than the vertical but the ratio of horizontal to vertical must be maintained or circles will always look egg-shaped."

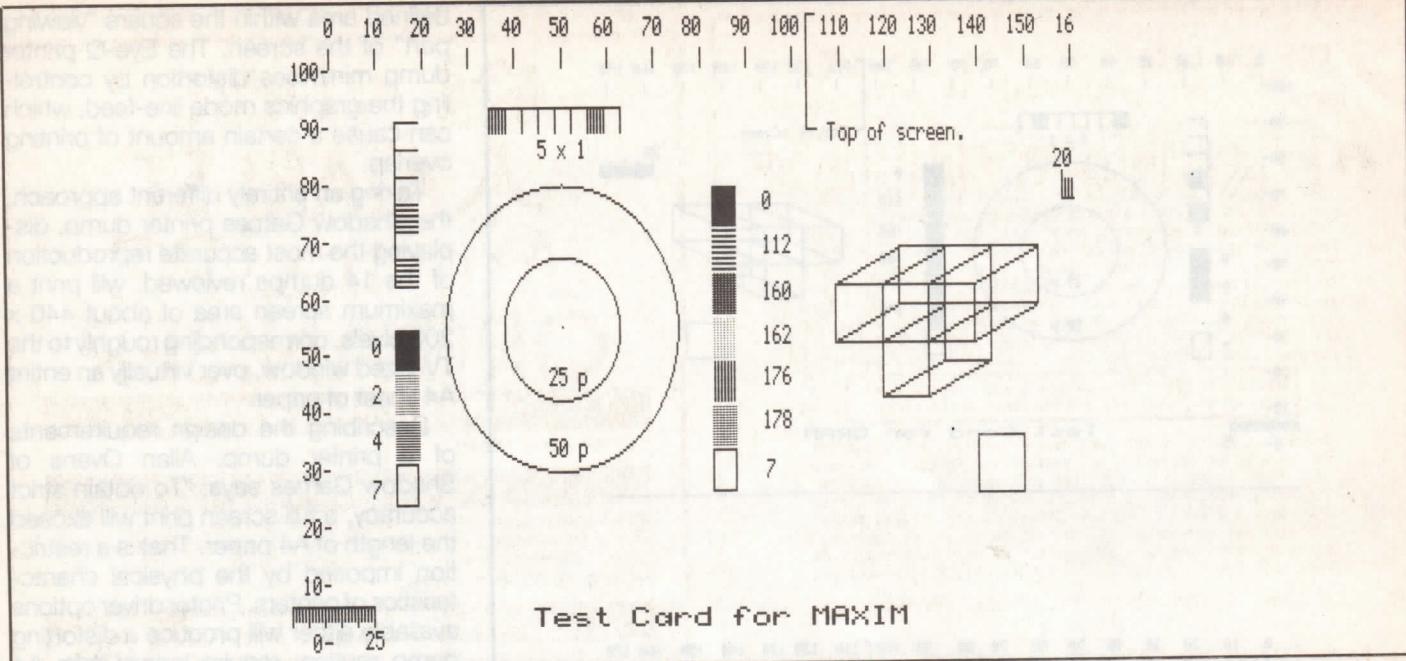
Printers, such as the Eidersoft Juki 5520, provide the option of full-colour hard copy. One of the better colour printers, the Juki, uses a four-colour ribbon — black, cyan, magenta and yellow — and also requires additional control codes from the printer dump to select the separate colour bands.

The complete colour spectrum is achieved by over-printing magenta and cyan, to simulate red; cyan and magenta, for blue; or yellow and cyan for the green. In addition to graphic dumps, the user has the option of producing letter characters either in draft mode or in near letter quality in full colour.

The Juki, incidentally, is available in its 5510 monochrome configuration and may be upgraded later to the full-colour 5520 specification.

While the quality of colour reproduction has improved tremendously in the last few years, colour printers are still confined to the same restrictions imposed on any form of printing.

One of the tricks with press printing, to minimise colour ink limitations, is to use a four-colour process in which each of the darker colours also includes a



Maxim's dump shows severe vertical elongation. Upper left corner defines print boundary, with clipping occurring by 16 pixels on the left and more than 12 pixels from the bottom of the screen.

proportion of black ink to improve image depth.

Inks available for ribbon printers limit the brilliance of some of the colours, most notably the reds and yellows. Formulation trade-offs of the chemical composition of inks dictate the maximum brilliance obtainable with any particular ink type.

Undoubtedly other approaches will become commonly available in the near future, improving colour printing quality. One approach being considered by manufacturers is using photocopier techniques of bonding plastic pigment thermally to paper. A printer of this type was recently released by I0 for around £5,000.

Printer dump performance

This chart is a representative example of dumps printed by a Canon PW1080A printer with mode 4 dumps, A4 paper size, and transport occurring on the long axis of the paper.

Normal and inverse notation refers to print occurring as black to black or black to white translation respectively. A negative dump produces complete tone reversals.

Where possible, test cards have been printed from the same screen file to achieve a degree of consistency. Where that has not been possible because of the methods used by some graphics programs for file-saving or screen sizes pertinent to particular programs, drawings produced with the programs have included colour patches and circles to derive performance figures given in the following comparison chart.

Printer Dump	Source	Distortion error	Tone Method of repres. define Area	Typ Dump Time
1. Shadow Game	Shadow Games	0.4%	Norm	4 Curbars
2. TechniQL	Talent	0.5%	Inv	Scrn define
3. Eye-Q	Digital Precision	2.2%	Neg *	Cuts L,R&Bot
4. Miracle	Miracle Systems	8.5%	Inv	Dim/Default
5. CADPAK	DataLink (Wales)	22%	Inv **	Full scrn
6. QL Peintre	Pyramide	34%	Norm	4 Curbars
7. Tascopy	Tasman	35%	Inv ***	Full scrn
8. Gprint-prt	Psion	23%	Inv	Dim window
9. Maxim	Intec	23%	Norm	Full scrn
10. ArtICE	Eldersoft	24%	Norm	Cur box
11. RAM disc	DS Enterprises	24%	Inv	Sm than scrn
12. Lotus Soft	Lotus Soft	24%	Norm	Sm than scrn
13. QDraw	Psion	24%	Inv	Full scrn
14. Scmcopy	DataManagement	61%	Norm	Sm than scrn

* Printer driver can be re-configured to produce required codes for non-Epson-compatible printers. Tonal representation is in negative with the Canon printer.

** Printer driver prints inverse but tem-

porarily reverses black and white automatically.

*** Printer driver can be configured to print in either normal or inverse black and white.

Dump colour definition	No. Per A4 page
1. Full colour and stipbles	Print Vert 1
2. Does not differentiate red and green	Horiz 2
3. Can be configured for printer LF; negative represent.	Horiz 2
4. Prints black and red as white; white and green as black	Horiz 3
5. Full colour and stipbles	Horiz 1
6. Red and green print the same; full stipple range	Vert 1
7. Full colour and stipbles	Vert 1
8. Prints black and white reversed.	Horiz 1
9. Full colour range; some stipbles hard to distinguish	Horiz 1
10. Red and green print the same; some stipbles difficult to distinguish.	Horiz 2
11. Full range of colours and stipbles; white as black	Horiz 1
12. Red and green print the same; some stipbles difficult to distinguish.	Horiz 1
13. Full colour and stipbles; white prints as black	Horiz 1
14. Black and red as black; white and green as white	Horiz 4

GRP SOFTWARE

01-552-5452

NEW! 17 ST. JOHN'S TERRACE, LONDON, E1 8BX, ENGLAND NEW!

FRONT PAGE

EXTRA! VISA

(For QL's with a minimum 256K expansion memory)
 If you've been crying out for good text handling, YOU NEED NOT WAIT ANY LONGER!
 You can now read .doc files, basic, and other popular text WITHOUT MODIFICATION!
 Microjustification! Automatic overflow to next column and next page! Choice of 2,3 or 4 columns! Change line, column, page and font during text file import!

WARNING BY GRP - This software may cause artwork, newsletters, leaflets and business stationery.

Front Page Extra is not just user-friendly, it's a doddle! No commands or mnemonics to remember (or forget!). No more than FOUR keystrokes from the main menu to any routine! Virtually everything is done via the function keys! Status and options always on screen! Cut and paste between pages! Multiple cut and paste! Window manipulation for centring, trimming, etc! Complete with primitive graphics! (Who needs more with Eye-Q around?) Two pages in only 256K expansion!

IT'S EASY TO LEARN, EASY TO USE, AND EASY TO AFFORD! IT'S

£37.95

And don't forget the original Front Page! STILL the only choice for a standard QL, and STILL only £22.50!

FRONT PAGE	£ 22.50	SIGN DESIGNER	£ 17.50	GRAPHIC+	£ 24.95
SLIPPER	£ 19.95	TASKMASTER	£ 25.00	TOUCH TYPST	£ 12.00
QL LIBERATOR	£ 60.00	PSION (Comp 1)	£ 29.95	FLASH SPRO	£ 25.00
FLASH ADV	£ 12.00	BLOND GREF	£ 10.00	SPELLBOUND	£ 30.00
EXPANDERMAX 512K	£ 100.00	SCHON KBD	£ 4.00	MP165 PRINTER	£ 238.00
RIBBONS	E RING	LABELS 89x36	£ 5.00	MOU LABELS	£ 2.00

EXCLUSIVE DISTRIBUTOR IN U.S.A. EXPORT PRICES

SHARPS INC., RT.10, BOX 459,
 MECHANICSVILLE, VA 23111, U.S.A.

Order value up to £75.00, as above
 including postage/packing.

Order value over £75.00, deduct 5%.

EXCLUSIVE DISTRIBUTOR IN SWEDEN

TM ELEKTRONIK, BOX 79,
 S-781 21 BORLÄNGE, SWEDEN

PAYMENT by postal order, cheque
 drawn on a UK bank, or Eurocheque.

FRONT PAGE EXTRA was compiled using QL LIBERATOR

CARET COMPUTERS

DISK 3.5" DS/DD	18.50	for 10 or 35.00 for 20
M'DRIVES CART(new)	17.50	for 10 or 30.00 for 20.
MIRACLE TRUMP CARD	199.00	(768K ram)
MIRACLE EXPANDERAM	99.00	(512K ram)
MIRACLE MODEM	49.00	
MIRACLE PRINTER INTERFACE	18.50	
INTERNAL MEMORY	99.00	
QL SERVICE MANUALS	22.00	
INTERNAL CLOCK	21.50	(e-z fitting no mess)
SCHON KEYBOARDS	57.00	
SOFTWARE		
TURBO (inc toolkit)	90.00	SUPER MEDIA
THE EDITOR	29.95	(SPECIAL EDITION)
EYE-Q	29.95	QLIBERATOR (v3.1)
QL MACRO ASSEMBLER	25.00	QL ED/ASM (ADDER)
QL ED/ASM (COLIN OPPIE)	29.95	QL ASSEMBLER (GST)
QL MONITOR (Qjump)	19.95	QL PROJECT PLANNER
QL HOME FINANCE	19.95	CASH TRADER
PSION SUITE 2.3	9.00	BASIC ALLY (TALENT)
QDRAW	12.95	CAD PACK
CARTRIDGE DOCTOR (ADDER)	14.95	
GAMES		
OMEGA (NEW)	14.95	DISK VER
JUNGLE EDDIE	13.95	ZKUL
3D SLIME	12.95	LOST PHARAOH
STRIP POKER	13.95	MATCH POINT
QL REVERSI	9.95	QL CLASSIC ADVENTURES
QL CAVERNS	9.95	QL BRIDGE

all products subject to availability



Please find my Enclosed Cheque for

Send me

My Name

Address

CARET COMPUTERS 22 CAVENDISH RD. LONDON NW6 7XP tel 01-4592267 PRESTEL MBX
 014592267 VISA/ACCESS CHEQUES POSTAL ORDERS

QL THOR ATARI ST Amstrad PC ORGANISER

EIDERSOFT OFFERS YOU MORE!

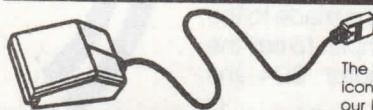
Full catalogue on request.

SUPPORT SERVICE

ESS offers you an amazing 20% discount off our published RRP's (except hardware and consumables). Full support in writing and a regular newsletter crammed with special offers and articles.

Now over 1500 members.

ESS + QL MOUSE SYSTEM £75



SPECIAL OFFERS!

The famous award winning ICE icon driven front end together with our latest superb mouse.

ESS + ANY GAME £17.95

Choose any of the games listed below to go with your ESS membership.

ESS ONLY £10.95

ICE SYSTEM

£69.95

Including ICE front end software. £15 trade in if you already own ICE. Postage £2.00.

ICE £29.95
 The award winning QL front end.

CHOICE SWITCHER £16.95

ARTICE GRAPHICS £14.95

ICICLE £14.95
 Icon control of your own programmes and the Psion packages.

TOOLKIT £12.95

QL SOFTWARE MART.

GAMES	
Qkick (disk only)	£24.95
Toolkit II	£14.95
Mandelbrot Magic	£14.95
Graphics Construction Kit	£14.95
Qwriter	£14.95
DP's Turbo Compiler	£79.95
Q Flash Ramdisk and tool kit	£17.95
QL Switch and Calculator + Basic	£16.95
10 Microdrive Cartridges + labels	£17.95
(10% ESS discount)	
Microdrive Labels 500 on Tractor Feed Colour	£4.95
White	£3.95
Floppy Diskettes (10)	£29.95
DDDS Only	
(10% ESS discount)	
Diffusion	£9.95
Full House	£12.95
BJ Returns	£10.95
Karate	£14.95
Spook	£10.95
QL Caverns	£7.50
Meteor Storm	£7.50
Games Pack	£16.95
(3 MD's 4 games)	

Please write or telephone for detailed information on any product.

QL DISK SYSTEMS Please telephone for an amazing price!

QL CONVERSIONS

QL → THOR

QL → AMSTRAD PC 1512

QL → ATARI ST

Please write or telephone for technical details and a full price list.
 All prices include VAT.

PSION ORGANISER

From £99

Please write or call for a full colour catalogue.

15% Vat +
 Post Inc.
 (Except Mouse)

Overseas
 Add £1.00 Per Item
 Postage

EIDERSOFT SOFTWARE LTD.

The Office, Hall Farm, N. Ockendon, Essex RM14 3QH.
Telephone: 0708 851099. VISA MASTERCARD

All prices are subject to change

M

any people who want to control devices from a QL will be more than happy with the SuperBasic extensions found in the Qontrol-II ROM described next month. Some, however, will be keen to improve and confirm their skills in assembly language programming. For those in particular we look now at the concepts behind the Qdos routines available for interfacing work.

The utility calls with which we are concerned here will enable us to request and release common heap areas, manipulate linked lists and queues, perform serial I/O operations and check device names. The utilities may be grouped into different types, although the method of accessing them is the same — through vectors. The appropriate call parameters are set up and then a subroutine call is made to the required vector. For example, to call the utility UT.UNLINK at vector \$D4 the following may be used:

```
; (Set call parameters)
;
move.w $D4,a4 ;Select 'unlink' utility
jsr (a4)
;
;
```

The principle of the linked list is simple enough, as figure one shows. A list pointer will point to the start of a list of nodes which contain two major compartments, an item stored in some form of data structure and a pointer to the next node in the list. There are a number of types of linked list, their differences being in the type of pointer system used and the form of the data structure in each node. So as not to become side-tracked in technicalities, we will concentrate on the type of linked list shown in figure one, as it is the type assumed by the utilities in which we are interested.

First we must have a list pointer, or we will have no way of starting the linked list. If there are no nodes — i.e., the linked list is empty — the list pointer will hold the value zero. A node to be entered into the

I
Colin Opie looks at some of the concepts behind the Qdos routines available for interfacing work.

linked list can be of any required size, because the utilities assume the use of a blocking-type linked list.

The important point about the block node is that there must be space at the start of the block for a link pointer. A nodal link pointer will contain a pointer address if it is not the last node in the list, or zero if it is the last node. There are standard algorithms for inserting and deleting nodes in a linked list about which we do not have to worry on the QL, as the utilities perform those operations.

A queue is a particular type of data structure where data is fed in at one end and retrieved from the other. An everyday example is the polite bus queue. The data objects, people, join a queue at one end. When a bus arrives the people get into it from the other end of the queue. There is, of course, no reason why both operations cannot run concurrently. The size of the queue will vary depending on how many people join the queue at one end and how many people leave the queue at the other end in a fixed period.

At that point the analogy must stop. Figure two shows a bounded queue structure as used in the Qdos utilities. One job may place bytes of data in at one end of the queue and another job may remove bytes from the other end. In the QL the two jobs may, of course, be a single job — in the true sense of a Qdos job — which has two procedures. One procedure will deal with the input to the queue while the other will deal with col-

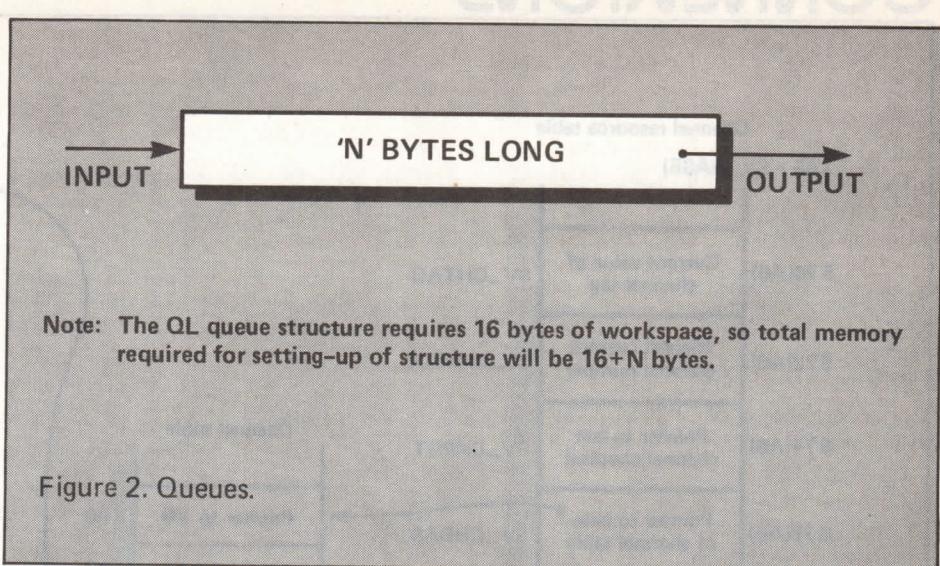


Figure 1. Simple linked list.

lecting the date from the queue. The queue has a fixed maximum length and may therefore become full if data keeps entering the queue without data being removed.

The converse is also true. The queue may become empty and unable to supply new data if data is being removed at a continuously faster rate than it is being entered. One particularly suitable use for queues is in the area of I/O, where the queue can act as a storage buffer between devices running at varying and/or different speeds.

The queues set up and manipulated by the utilities need 16 bytes at the beginning of the specified storage area for a queue for internal management purposes:



Offset	Size	Use
\$00	bit	End of file flag (MSBit)
\$00	long	Link to next queue
\$04	long	Pointer to end of queue
\$08	long	Pointer to insert location
\$0C	long	Pointer to retrieve location
\$10		(Start of queue)

It is not particularly important that you know about that management data structure, other than that you must set up your queue by specifying a queue length 16 bytes greater than the size of the queue you want.

As with linked lists, there are standard algorithms for queue manipulation. The algorithms cater for insertion, deletion and the testing of bounded queue

status. It is that kind of operation the utilities provide for us.

Qdos maintains a channel resource management table, which holds such information as the highest known channel number, and so — on see figure three. Two pointers within the table, SV CHBAS and SV CHTOP, point to the base and top-of-the Channel table respectively. The pointers in the channel table — long-words — point, in turn, to

IO.SERQ — vector \$E8 — may be used to perform direct queue handling with a number of standard I/O procedures. If the input and output routines for the data need to be more complex, the utility IO.SERIO — vector \$EA — should be used and the addresses for the specialised I/O routines supplied with the call.

The utility IO.NAME — vector \$122 — can be used to check a supplied device name for correctness and, if correct, return the default and/or given parameters. That is useful and will save you a good deal of work.

There is a standard format for the definition of device names which embodies the specification for the name, any parameters, and any additional codes. The definition must have the following form:

Size	Description
word (even number of bytes)	Number of characters in the name Name (padded with zero if odd length)
word (‘n’ parameters)	Number of parameters

the corresponding channel definition blocks. Figure three shows the layout for plain serial queues.

This layout is simple but is all that is required if the serial I/O can be managed successfully by the use of input and output queues. In such cases the utility

Each parameter definition may take one of three forms:

1. A space plus a separator, followed by the default value. Both parts are of size word, implemented by, for example:
`defb ' ' , 448`

CONTINUED
OVER PAGE

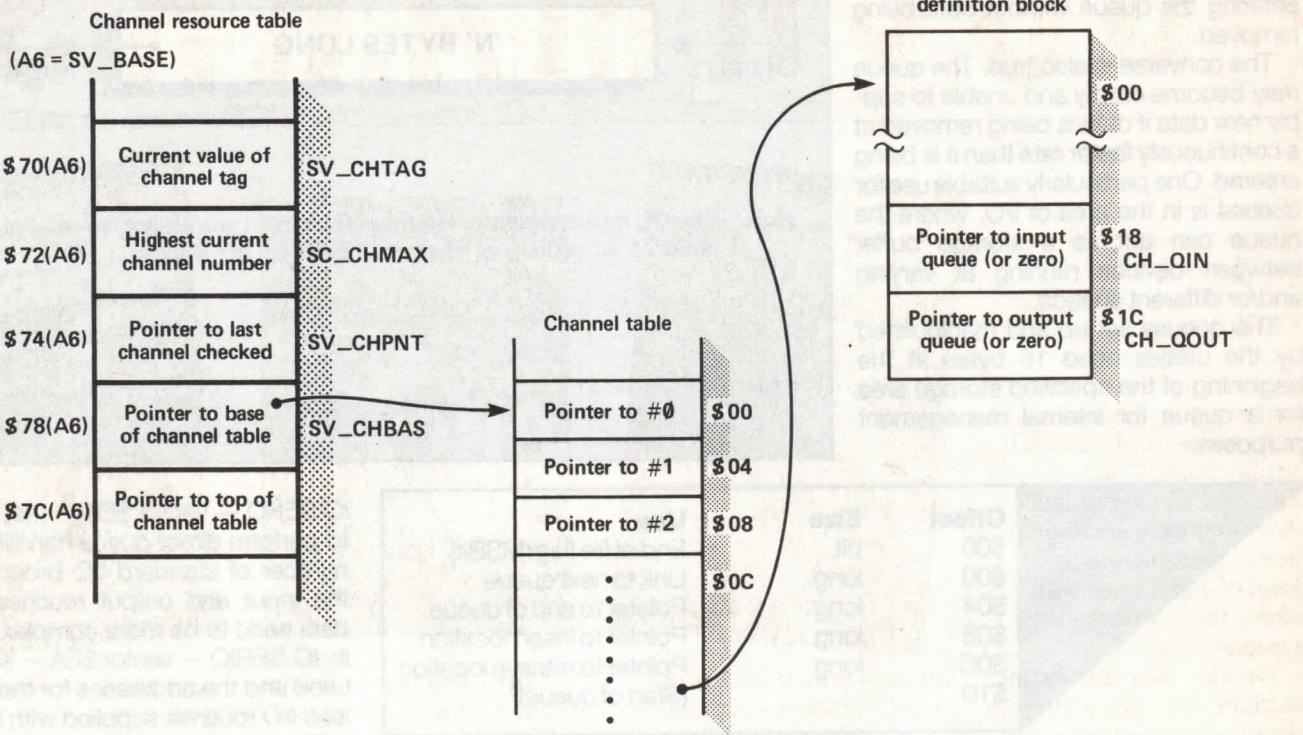


Figure 3. Serial I/O channel definition block

2. A negative number — e.g., -1 — followed by default number. Both parts are of size word, implemented by, for example:
`defw -1,2`

Note that in this case the default value is appended to the name with no separator.

3. Number of codes, followed by the list of codes. The number of codes is of size word and the code list must be an even number of bytes, padded by a zero if necessary. For example:

```
defw 3
defb 'POI',0
```

All alpha characters in the definition must be in upper-case. For each numeric parameter — i.e., types 1 and 2 — the utility will return either a supplied value or the default value given in the definition. For each code parameter — type 2 — the utility will return the position of the code in the definition list; the first code has a positional value of unity, not zero.

There are two examples, catered for by Qdos already, which highlight the definition structure described. They are the internal definitions for the console and the serial ports. First, let us look at the console definition:

```
defw 3      ;console
defb 'CON',0
defw 5      ;five parameters
defb ''     ;- window size (2)
defw 448
```

```
defb 'X'
defw 180
defb 'A'    ; - window position (2)
defw 32
defb 'X'
defw 16
defb ''    ; - kbd queue length (1)
defw 128
```

This definition for the console will enable us to supply, by way of example, the following legal codes:

Entry	Parameters returned
con	448, 180, 32, 16, 128
con 256	<u>256</u> , 180, 32, 16, 128
con 60	448, 180, 32, 16, <u>60</u>
CONa0x12	448, 180, <u>0</u> , 12, 128
con 256x	<u>256</u> , 64, 64, 128, 20
	64a64x128-20

Parameters underlined represent supplied parameters in the given name. All the other parameters are supplied by the utility by virtue of default settings. Now let us look at the serial definitions:

```
defw 3      ;RS232 serial device
defb 'SER',0
defw 3      ;three parameters
defw -1,1   ;- port (default '1')
defw 4      ;- parity types
defb 'EOMS'
defw 2      :- handshaking
defb 'IH'
```

This definition for the serial ports will enable us to supply, by way of example, the following legal codes:

Entry	Parameters returned
ser	1,0,0
SERE	1,1,0
ser2mi	2,3,1

Note that, although the alpha characters in the definitions have to be in upper-case, the supplied names may be in upper or lower-case.

The different nature of each of the utility types — whether or not they are executed in supervisor mode — will be dealt with in the supplement document available on Microdrive through *QL World*. There will be no need for you to buy this item if you intend only to control things from Qontrol-II Control SuperBasic extensions.

We can discuss the overall use of registers now. Some utilities require address register A6 to point to some base address or variable table. Utilities which return an error code will do so in the form of a long-word in data register DO. If the error code returned is not zero, an error has occurred. Small negative codes are used to indicate the standard Qdos errors. Additionally, the error code returned can be a pointer to a specific error message.

•BOOKMARKS•

Book: Calculating with QL

Abacus

Price: £7.95

Source: Longman Group Ltd, Longman House, Burnt Mill, Harlow, Essex CM20 2JE.

Continuing the superb format developed by Longman in its series of practical QL applications, Malcolm Smith's *Calculating with QL Abacus* makes no assumptions regarding readers' level of experience with either the QL or the use of spreadsheets.

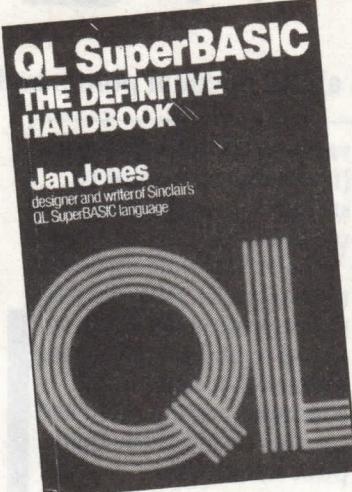
Divided into four distinct sections, the first chapter, in the form of an introduction, starts with a condensed summary of basic QL operations. Chapters two to nine provide clear and concise information for using Abacus, from basic theory of spreadsheets to using the system commands.

The biggest part of the book, however, is devoted to practical applications of Abacus in worked spreadsheet models. Throughout users are encouraged to amalgamate Archive, Quill and Easel.

First of the models, computer-aided horse-racing selection, details methods of utilising readily-available racing form for improving betting odds. Calorie-controlled diet spreadsheets integrate user-applicable details for monitoring constituent dietary elements to obtain the most efficient nutrition to expenditure of energy ratio.

Mortgage spreadsheets analyse particular mortgage structures, as well as comparing benefits obtainable from different types of mortgages. Share transaction strategy models help you to follow and assess share performances.

In spite of tremendous odds against selecting the correct eight football fix-



tures — well in excess of 1,000 million-to-one against — a significant number of people complete coupons every week. Using a spreadsheet to provide a method of calculation against past and present team form can and apparently does lessen the odds considerably.

Book: QL SuperBasic: The Definitive Handbook, Jan Jones **Price:** £9.95

Book: QL Assembly Language Programming, Colin Opie **Price:** £12.95

Product: Editor/Assembler **Price:** £12.95

Source: McGraw-Hill Book Co (U.K.) Ltd., Maidenhead, Berkshire.

Two books from McGraw-Hill, well worth consideration if you are looking for additions for your library of QL programming reference works, are available for serious QL enthusiasts. Almost anyone who has done serious work with QLs has soon recognised that whole sections of the Users' Guide leave much to be desired. As computer documentation goes, it is certainly one of the better manuals but much of the information concerning SuperBasic, at least so far as users new to computing are concerned, is laconic almost to the point of being unintelligible.

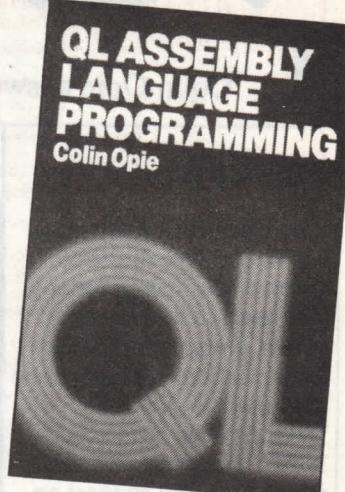


Correcting the somewhat limited scope of the Guide, admirably, *QL SuperBasic: The Definitive Handbook*, by Jan Jones — also the originator of SuperBasic — goes a long way towards redress and covers every aspect of programming with SuperBasic.

Opening with an introduction as to why the author felt that another SuperBasic manual was necessary, he expresses dissatisfaction with the presentation of many of the other books on the subject. Related keywords are grouped in chapters and are each defined in great but highly-readable detail. One of the attractions is that, rather than relying on the usual dry glossary approach of other similar books, the author details the implications of SuperBasic keywords and has included lucid illustrations and syntax flow charts.

The second offering from McGraw-Hill, Colin Opie's *QL Assembly Language Programming*, is exceptional in that you also have the option of obtaining the *Editor/Assembler* around which Programming was written.

While not what could be described as a state-of-the-art assembler in that the program does not support macros, it is nonetheless a



very good, professional-quality assembler with which newcomers to machine code programming can easily get to grips.

A companion cartridge to the assembler, program listings and assembled object code from the examples included in the Assembly Language Programming manual, is also available. A source of valuable experience working with machine code, the examples are also useful inclusions in a routines library. Divided into four main sections, chapters included in each part explain the internal workings of Qdos:

Part 1 details the 6800 processor instructions and addressing modes;

Part 2 opens with a description of the concept around which Qdos was built and goes on to esoteric instructions regarding the traps, utility routines and linking into SuperBasic;

Part 3 includes numerous programming examples and delves into graphics and SuperBasic extensions;

Part 4 provides information additional to the assembler and editor documentation.

Four appendices are included for quick reference to error codes, the 6800 instruction set, system calls and the editor/assembler.

TECHNICAL

Colin Opie answers some common problems about decimal points and floating point numbers.

No abacus

I am compiling a program which involves messing about with sums of money. To round to two decimal places, I am using the formula...where X = sum to be rounded.....X%=(X*100+.5) does not exceed 32767, the error 'overflow' point. Can you suggest an alternative method?.....I do not wish to use Abacus in this instance.

R. D. Hardie,
Great Yarmouth.

It seems that the business user of the QL is not content with off-the-shelf packages, as indicated by the number of enquiries in recent months regarding the printing of numbers to two decimal places. Hardie poses the same question, having noticed that his simple algorithm of printing the value $\text{INT}(\text{value} * 100 + 0.5) / 100$ fails to work with initial values greater than 327.65 pounds.

Not only is this algorithm limited to small initial values — far too small for even a one-man business — there is also the feature that it will not line-up the decimal point automatically when printing the result. The real task is to create an algorithm which will work for large numbers, e.g., at least up to a £1 million and align the decimal point automatically. The procedure shown in figure one is one solution.

The procedure which does all the work is between lines 200 and 320. The small program before that is to let

you test the effectiveness of the procedure. Values up to 9999999.99 pounds, i.e., one penny less than 10 million pounds will be processed correctly. The result will always be displayed in an 11-character field. For positive values the left-most position will be a space and the rest of the number will be right-justified in the remaining 10 character spaces. Negative values differ from this only in having the left-most position filled with a '-' character. Should you need the floating point value of the displayed result it is a simple matter to change line 310 to:

310 PRINT v\$(1 TO 10):
money=v\$(1 TO 10)

That will set the global variable 'money' to the respective floating point value for use in later calculations. Should you wish to alter the working range of the algorithm, adjust the storage length of the string

variable 'v\$' and the initial (maximum) power of 10 stored in variable 'power' — see line 210.

It would also be very easy to change the procedure so that it prints the result to any specified channel. Pass a channel number in the command argument list and use this to adjust the final print statements:

```
130 display money(v,c)
:
200 DEFine PROCedure
display monney
(value,chan)
:
300 IF value>=0:
PRINT#chan, "-";
310 PRINT#chan, v$(1 TO
10)
```

The procedure will start printing the 11-character result at the current cursor position, so it would be easy to position the cursor, using 'AT' before calling the procedure if formatted screen displays were required.

```
100 CLS
110 REPeat loop
120 INPUT "Value?"; v
130 display-money(v)
140 END REPeat loop
150 STOP
160 :
200 DEFine PROCedure display-money(value)
210 LOCal v$(10),power,lz,v,i: power=1E6:.lz=0:
v=(ABS(value)*100+.5)/100: i=1
220 digit=INT(v/power)+CODE('O')
230 IF (digit>CODE('O'))AND(lz=0): lz=1
240 IF lz=0: v$(i)=": ELSE: v$(i)=CHR$(digit)
250 i=i+1: digit=digit-CODE('O')
260 v=v-(digit*power): power=power/10
270 IF power=.1: v$(i)=': i=i+1
280 IF power >5E-3: GO TO 220
290 IF v$(1 TO 10)=' ': v$=' 0.00'
300 IF value>=0: PRINT '': ELSE : PRINT "-"
310 PRINT v$(1 TO 10)
320 END DEFine
```

Figure 1. Money notation printing procedure.

VBaluing Mr T

When this program is run the value T which should be = 0 is not, which is puzzling, because we know this is wrong and have proved it by running the program on a new Commodore C28 computer, which correctly returns T = 0 Answer:

Could you explain this annually? This section of program is used for business.

Our GL computer is a JM 1.03 version.

```
5 REMark --- PROGRAM-
MING PROBLEM
10 CLS
15 x=PI
20 y=COS(x)
25 PRINT y
30 q=(y)
35 PRINT q
40 t=1-q
45 PRINT t
```

G.E. Chorley,
Bournemouth.

The trouble with using floating point numbers in computer systems is that a precise representation of all possible values is not possible. Further, some floating point algorithms, particularly those implemented in software and in general-purpose, low-cost microcomputers, are not so sharp around the well-defined limits as they could be.

The problem presented by Chorley is a brilliant example of this error in precision. It also indicates the fine line of difference between what the command PRINT thinks a number is and what that number actu-

HELPLINE

Write to: Technical Helpline, Sinclair QL World, Greencoat House, Francis Street, London SW1P 1DG.

ally is. Let us look at the short program closely:

```
10 CLS  
15 x=PI  
20 y=COS(x)  
25 PRINT y  
30 q=ABS(y)  
35 PRINT q  
40 t=-1-q  
45 PRINT t
```

When the variables 'y' and 'q' are printed, the results '-1' and '1' are displayed. So you think the program must be working but were the internally-stored values of 'y' and 'q' really the values shown? The answer is no. It is that PRINT thought they were close enough to these values as to make no difference, bearing in mind that any deviation was from a base value of unity.

When line 40 is executed, any deviation from the 'true' value becomes a deviation from a base value of zero. The PRINT command may not be able to display the 0.00000001 deviation from unity but it can certainly show it as a deviation from zero, i.e., as 1.0E-9.

So far as the QL is concerned you will always meet problems like this where the error in precision is beyond the sixth decimal place. One solution would be to fool the QL into thinking that PI was equivalent to a value other than that set internally in SuperBasic. You will find, for example, that setting $x=3.141594$ instead of PI — set internally to 3.141593 — will produce results one might normally expect but I leave it to you to decide whether the 'correct' results displayed really are precise.

Oh Brother

I am writing regarding the advice given by Colin Opie on connecting the EP22 typewriter/printer to the QL in the February issue. I have one of these machines and unfortunately must differ over the assumptions. The EP22 is not like the EP44, either in print quality or facilities. As a cheap printer the EP22 is reasonable but as a letter-writing machine the quality of the print is nowhere near good enough for official correspondence, except sending letters to friends.

Denis Green,
Bournemouth.

As a Brother EP44 user could you outline the procedure for exporting documents from the EP44 to the QL and Quill? Some time ago a young programmer gave me a program to do this but it was only partially successful and has since become corrupted and useless.

David Drysdale,
Manchester.

Do you ever get the feeling you might have said something wrong? Green and at least two other people have written to say that the driver information for the EP22 in the February issue was not correct. Well, not entirely correct anyway. The cable wiring diagram given was correct and you should still abide by it. Unfortunately, though, the EP22 is

nowhere near so versatile as the EP44 and setting it up for transmission is therefore much simpler.

The EP22 does not have a terminal mode but rather a printer mode. When in printer mode the only thing you can change is the baud rate, which you toggle between 75 or 300 baud by using the ENTER key. Something not mentioned in the February issue but common to both the EP22 and the EP44 is the use of the 'CONT' key to go on-

again, the wiring table in the February issue should be used to permit two-way communication between the EP44 and the QL. I will also assume that the EP44 terminal settings and the Quill driver are set up as shown in the February issue. Importing text into Quill is very easy. The question therefore is "How do we transfer text from the EP44 to a QL file?". The program in figure two will work admirably and can be adapted easily if necessary.

```
100 REMark EP44 loader  
110 BAUD 1200  
120 OPEN#3,ser1  
130 OPEN NEW#4,'mdv2ep44doc'  
140 PRINT'Press TEXT key on EP44...'  
150 d$=INKEY$(#3,-1): d$=CODE(d$)  
160 SElect ON d  
170 =26: GO TO 230  
180 =13: PRINT CHR$(10);:PRINT#4,CHR$(10);  
190 =10: REMark ignore  
200 =REMAINDER :PRINT d$;:PRINT#4,d$;  
210 END Select  
220 GO TO 150  
230 CLOSE#4:CLOSE#3
```

Figure 2. EP44 loader program.

line and the 'STOP' key to go off-line.

Finally, the Quill driver should be amended so that 'Chars/line' is set to 72 and the 'EOL code' is set to 'CR,LF' — both are needed. The EP22 does not support underlining and so all other parameters can remain unset. If you want to get the pound sign displayed properly you can set the 'TRANSLATE1' option to ",156".

A number of people also latched on to the EP44/EP22 article. They asked how to get the text in the memory of the EP44 to go to a QL or into Quill. Once

Run the program and, when asked, press the TEXT button on the EP44. The text in the memory will then be transferred to the QL file. An echo of the proceedings will be shown on the screen. You must type 'CODE Z' ON THE EP44, once all the text has been transferred, to get the program to terminate properly. You must import the file contents into Quill at some later stage if this is desired. Note that you cannot import directly into Quill using the device 'ser1' as Quill will think that it is a file name on the default drive.

•PSION•SOLUTIONS•

Ron Massey digs into the bulging mailsack for your queries on the various Psion programs in circulation and offers instant help in these pages.

Three questions often asked regarding the Psion programs — besides printer-specific drivers — and, most particularly, Quill, are: Will Psion XChange be made available for the expanded QL? Is it possible to have more than 10 translate functions? Is it possible to set up screen defaults so that Quill will default to a no-prompts screen, or to specific page formats?

Although XChange is available for the Thor, despite the interest of QL owners in having it, it is not, at present, anyone's intention to take XChange over to the QL.

To put the situation in perspective, I have it on good authority that XChange Archive, Psion arguments to the contrary notwithstanding, enjoys not a jot's difference from the current QL version of Archive. XChange, Quill and

Three of the best

Abacus are not perceptibly different from the standard QL versions either.

The principal differences between XChange and the QL Psion suite is that Easel includes a facility for 3D graph representation and XChange includes a built-in switching routine. If having a switching routine is important to you — I use one all the time — you may care to consider acquiring Taskmaster, a genuine multi-tasker with code-sharing capabilities, or QL Switch, to name two, which equal or surpass the system available to XChange users.

Although it is possible theoretically to alter Quill start-up defaults, it is definitely not to be recommended. If you have the ability to modify Quill code to that extent,

it may be possible to have a Quill which is still reliable but I feel that there are other, simpler ways around the problem which involve far less risk.

One of the alternative solutions is to use Keydefine, available from Psientific Software and other suppliers, to define a single key — used with ALT — to format the screen and page layout to particular requirements.

Taskmaster includes a versatile facility for building command files for this and a variety of similar applications.

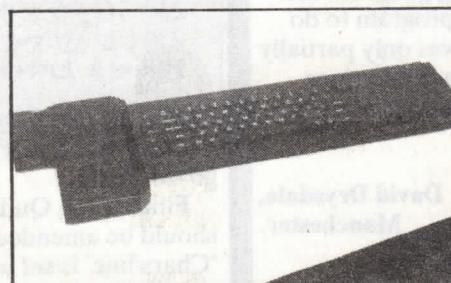
The Psion Solutions team is investigating the possibility of producing a printer driver containing more than 10 translate options. Watch this space.

Dumping Archive screens

From W. Moyle, of Didcot, Oxfordshire, there is a request for information regarding printing an Archive screen, complete with the text produced by Sedit. The best solution for this requirement depends on a number of factors such as exactly what form of dump is most useful but, most important, how much memory is available to run any of the various utilities suitable for the job and, where extra memory is not available, what compromises are acceptable.

If the imbedded information contained in a screen produced by Sedit is what is required, Chas Dillon's *Archive Screen Format Printer*, marketed by PDQL, may be the answer. This valuable utility was reviewed in the February Utility File and further details can be obtained by contacting PDQL.

If printing Archive screens, complete with Sedit-originated text, along with selected database records is what is required, a utility which may be ideal for



the purpose is QJump-QRAM. Intended as the service front end for the Sandy Futura, QRAM includes a range of good graphic drivers for several types of mono and colour dot matrix printers which can accommodate up to three graphic dumps on a sheet of A4 paper and may be represented as normal or inverse dumps.

A different approach towards the same end, QKick is another type of background utility but it does not include a graphic printer driver; 32K screen dump files may be made of selected

records and later printed as a group. If the dumps need to be modified for changing colours, most graphic programs — Eye-Q is a particularly good — include a re-colour facility.

Both solutions are store-intensive. QRAM cannot be run in a standard 128K QL, at least not alongside any of the Psion programs; QKick works only with either disc drives or RAM disc — it does not work with Microdrives.

I have seen three prototype graphic printer spoolers in the last two months which use a hotkey to call their routines.

Send your questions on Psion subjects to Psion Solutions, Sinclair QL World, Greencoat House, Francis Street, London SW1P 1DG

Include your name, age and full address.

D. Shillam, of Ealing, London W13, says he was disappointed to learn that QL Turbo Quill, reviewed recently in Utility File, offered only a 10 percent increase in speed. His letter adds that his range of most frequently-used commands is LOAD, SAVE, GOTO, SEARCH, BACKUP and erasing. He is apparently also having problems getting the Qflash RAM disk EPROM version to work.

QL Turbo Quill offers users a means of speeding Quills cursor handling — its more serious shortcoming. The 10 percent quoted from the review was for an average speed increase but was considerably greater for some operations than others and well worth having.

Athene will soon be releasing a faster Quill modifier, *Turbo + Quill*.

File-handling considerations are a different problem. The principal difference between nominal versions 2.00 and 2.30 Quill is a difference in file handling, most notably the SAVE time. For document lengths smaller than 32K, Quill version 2.00 had much to be said for it but exceeding the 32K limit almost invariably failed to SAVE a usable document. Psion was compelled to supply a patch to correct what amounted to a bug.

The time required for file-handling for

•PSION•SOLUTIONS•

large documents — more than 2,000 words or so — is common to almost every dedicated word processor available. I prefer a correct SAVE to a fast one but if this is unacceptable, why not consider using *The Editor*?

If you have a RAM disc, why not configure your Quill to default to ram 1 for its data device?

If the option to quit Quill rather than the usual reset is chosen, adding two groups of lines to the Quill boot will do the transfer work automatically. If you are using a standard RAM disc, at the beginning of the Quill boot add the following at the:

1 FORMAT ram1 - n (where *n* is the required number of sectors).

Dynamic RAM discs have varying formatting requirements, so this line may need adapting to particular types of RAM disc. At the end of the Quill boot program, add:

300 DIR ram1 -
310 INPUT/ "Name of file to

transfer? ";filename\$
320 DELETE 'flp2 - '& filename\$
330 COPY 'ram1 - '& filename\$
TO 'flp2 - '& filename\$

Those lines will be executed only when you quit Quill. This could be improved to include a repeat loop for multiple files, with a quit option, once all the files were transferred to a drive.

If you have a toolkit supporting wildcard commands, you could use:

320 WCOPY 'ram1 - &
filename, 'flp2 - '& filename

That has the advantage that existing files on a drive are updated and any number of files will be copied from RAM disc to the specified drive.

In common with the majority of EPROM add-ons, the Qflash RAM disc must be initialised prior to use. The procedure for doing so is detailed in the documentation; type-in the SuperBasic extension "QFLASH" before booting Quill, or add the "QFLASH" to the Quill boot program.

WALLET FRIENDLY SOFTWARE

Computer One Pascal £39.95

Computer One Pascal is a powerful implementation of the classic programming language. Produced specifically for the QL, this package provides a professional and highly educational programming system. Complete with comprehensive 100 page manual, this is the ultimate compiler that no QL enthusiast should be without.

- Full screen editor
- Example programs
- Produces multitasking programs
- Fast efficient code
- QL graphics and sound extensions
- Professional 100 page User Guide
- Full implementation close to ISO standard
- Integration with assembly language

Computer One Forth £39.95

A full implementation of the FORTH-83 standard with full access to the power of the QL including graphics, file handling and sound. Extremely fast code is produced, with the option of making stand-alone multitasking jobs.

- Full FORTH-83 standard
- Example programs
- Multitasking extensions
- Easily extended
- Easily understood 100 page User Guide
- Full 68000 MACRO Assembler included

Computer One Assembler £29.95

The Computer One Assembler is a comprehensive and professional 68000 assembler package for the new or experienced user. It is extremely fast, and includes a full screen editor and typeset manual.

- Multitasking 68000 assembler
- Full screen editor
- Integrates with Pascal and Basic
- Full assembler listing
- Linker
- Comprehensive User Guide
- 'INCLUDE' file facility
- Extremely fast

Computer One Monitor £19.95

This multitasking package really has to be seen to be believed. The basic features include providing a configurable multi-window display, disassembler, breakpoints, single stepping, memory and register display etc. More unusual features include the ability to clone monitor commands, so for example you can set up a job to maintain an up to date memory dump within a screen window.

- Integral disassembler
- Trace code in RAM or ROM
- Move and search memory
- Queue tracing
- Memory and register modify and display
- Breakpoints in RAM or ROM
- Full job inspection and control
- Configurable multi-window display

Computer One Typing Tutor £14.95

Let your QL teach you to type! The Computer One Typing Tutor is a fast, easy and enjoyable way of learning true touch-typing on your QL.

- Self-paced tutorials
- Interactive colour graphics
- Speed and accuracy diagnosis
- Typeset User Guide

Task Swopper £19.95

Simply the most compact and easy to use task swopper with true multitasking. Works on even an ordinary 128K QL. Tasks can be loaded with a simple 'exec' type command and are then available at the touch of a button — no tiresome menus to scroll through. Several jobs can be automatically loaded from a basic program each time you switch on your QL. Swopper will even set these programs up for you by for example, loading your letter head into Quill or opening a database under Archive.

- Only uses 10K plus screen storage
- Simple 'Hot-Key' operation
- Fully automatic task loading & set-up
- Instant swapping and screen preservation
- Easy to follow comprehensive manual
- 128K QL: 1 Psion program plus Basic
- 640K QL: 7 Psion programs plus Basic
- Permanent access to Basic
- True multitasking
- Enhanced Basic RESPR() command

Microdrive Copycat £10.99

Copies many protected programs. Simply load from mdv1, then insert the original and a blank cartridge and wait while Copycat does the work. Sold subject to legal use.

Boot 128K £5.99

Enables an expanded QL to run programs that won't normally run with extra RAM. Since you bought your memory expansion, you've probably discovered that several programs simply won't work any more. BOOT 128K will fix that. Just insert it in mdv1, boot your QL, wait... and run your fussy software. Easily configurable.

Undistorted Screen Dump £5.99

Enables you to obtain undistorted screen dumps with an Epson FX80 printer.

Microdrive Toolkits

Read and write Microdrive sectors from Basic or assembly language programs.

Enables the programmer to read and write Microdrive sectors, read Microdrive headers, including the Microdrive random number, and format a Microdrive with a given random number. The comprehensive 8 page manual details the toolkit and provides a wealth of information about the QL Microdrive format.

Basic Extensions (adds six Basic functions)	£9.99
Assembly Language (over 1000 lines of source code)	£19.95
Both on one cartridge	£24.95

Ask for our full catalogue of QL hardware and software. Dealer enquiries welcome.

Name _____

Address _____

Please send me: _____ I enclose £ _____

COMPWARE

PRICES INCLUDE VAT & DELIVERY · EXPORT ORDERS WELCOME · WRITE FOR DETAILS

THE

P+R=O=G=S

If you have a program that is worthy of consideration, send it to 'The Progs', Sinclair QL World, Greencoat House, Francis Street, London SW1P 1DG. We pay for everything published at the usual page rates — £80 per thousand words.

The Progs is a very popular section of *Sinclair QL World* and has featured some excellent programs, the best of which are still available through Microdrive Exchange. In addition to continuing The Progs section, we are expanding the programs available on Microdrive Exchange, giving you even greater scope for marketing your programs. It also enables us to offer programs which are far too long to be printed in the magazine.

We have been sent hundreds of programs in the last few months, so do not be too surprised if you have heard nothing. We are now working through the backlog and you should receive some form of confirmation that your program has been reviewed in the next few weeks. If that is not the case you may like to consider re-submitting your program.

Others may not have considered submitting programs because of their length. If that is the case, we are now considering programs of any length for Microdrive Exchange, so let us see them.

If you have written a program and would like to have it published in The Progs, or sold through Microdrive Exchange, send it to The Progs, Sinclair QL World, Greencoat House, Francis Street, London SW1P 1DG.

There are a number of items you should try to include. We

will need a copy of the program on Microdrive cartridge, with a Quill document containing any instructions necessary to run the program. You should include a printout of the Quill document and, if possible, a 50-column listing of the program. Please do not forget to include your name, address and, if possible, telephone number, specifying when you will be available on that number. Enclose a SAE if you would like your cartridge returned in the event of your program being unsuitable for submission.

256K RAM

In some cases the programs we receive have minimum requirements, such as 256K RAM and so on. If that is the case, state that clearly on the covering letter. It would not be the first time a program of this kind had been returned because it did not work on an unexpanded machine.

If you are sending a machine code program you should also include a Basic hex loader in addition to the object code. You can use the loader from our DIY Toolkit series rather than having to write your own. If you are sending a utility, please include a fully-working demonstration of how it works.

Finally, it would be helpful if you could state whether you are willing for the program to appear in The Progs, Microdrive Exchange, or both.

With our new system, normally you will hear from us in less than two months from the date of submission. Your program will be evaluated and you will receive one of two letters. If we are interested in publishing the program, you will receive a letter to that effect and a small form asking whether you are willing to have your program featured in The Progs or Microdrive Exchange and confirming the rates.

Alternatively, if your program is unsuitable, you will receive a letter explaining the reasons for rejection and suggestions for possible improvement. We apologise that the explanations are somewhat brief but we receive far too many programs to be able to spend any length of time on each of them.

Payment

We pay between £30 and £50 per page for programs printed in The Progs section. The amount depends on page layout. Programs sold through Microdrive Exchange earn their authors 25 percent of the selling price. It can be lucrative, with the most popular programs selling many hundreds of copies.

In some cases programs will be printed initially in the magazine, then sold through Microdrive Exchange, possibly in an extended form. In those cases, we pay half the normal

page rate for the printed listing and the full 25 percent on Microdrive Exchange.

The quality of programs submitted to *QL World* has always been relatively high, reflecting the competence of many QL owners. In general, we are looking for well-produced, original ideas. Look through a few of the back issues to see the type of program we prefer.

The key

Originality is the key. We are not particularly interested in yet another graph plotting program, yet another bomb dropping game, programs to solve simultaneous equations, play battleships, and so on. Programs are not considered original for the QL if they have been printed dozens of times for other machines. This does not mean that we are not interested in seeing card games, arcade games and such, but they must be of exceptional quality.

In general, bear in mind that somebody will either spend a fair amount of their precious time typing-in your program from The Progs, or spending some of their hard-earned cash buying it from Microdrive Exchange. The program must be worth it.

P+R=O=G=S

1000 REMark
1010 REMark

PICTURE PUZZLE
BY K.M.CAMERON

100 REMark
110 REMark

PONTOON version I
Copyright Huw Pendry 1986

PICTURE PUZZLE by KENNETH CAMERON

Picture Puzzle is a one-player game in which a picture is scrambled on the screen. The object is to unscramble it in as few moves as possible. It is done in a similar manner to the conventional sliding block puzzles, where a block is slid into an adjacent blank space, thus

creating a new blank space, and so on.

The game uses an 8 x 8 grid of sliding blocks which can either be numbered or can load a graphic screen from Microdrive. The game can be stopped at any time by pressing the 'S' key.

```

1000 REMark PICTURE PUZZLE
1010 REMark BY K.M.CAMERON
1020 MODE 8
1030 OPEN#1,CON_512X256A0X0_100
1040 PAPER 0:INK 7:FLASH 0:OVER 0:CLS
1050 CSIZE 1,1
1060 AT 1,8:PRINT "PICTURE PUZZLE"
1070 CSIZE 1,0:AT 4,4:PRINT "BY KENNETH CAMERON 19
86"
1080 WINDOW 448,150,32,70
1090 CSIZE 0,0
1100 PRINT"A PICTURE WILL BE DIVIDED INTO 64PA
RTS,THEN SCRAMBLED USING THE CURSORKEYS AND MOVI
NG ONE PIECE AT A TIMEYOU MUST RESTORE THE PICTURE
THE SCRAMBLING WILL STOP WHEN YOUPRES
S THE SPACE BAR.PRESS 'S' TO EXITGAME."
1110 INPUT \DO YOU WANT TO USE THE NUMBER GRID OR
LOAD A PICTURE FROM MICRO DRIVE, (G or P):";N$
1120 IF N$=="G" OR N$=="P" THEN N$=N$:ELSE N$="G"
1130 IF N$=="G" THEN GRID:GO TO 1210
1140 PRINT\PLACE CARTRIDGE IN MICRODRIVE 1,
1150 INPUT\WHAT IS IT CALLED:";T$
1160 IF T$="" THEN GRID:GO TO 1210
1170 INPUT \4 OR 8 COLOURS:";C$
1180 IF C$<>"4" AND C$<>"8" THEN C$="8"
1190 MODE C$:WINDOW 512,256,0,0:CLS
1200 LBYTES "MDV1_"&T$,131072

```

1210 SCRAMBLE

1220 PLAY

1230 RUN

```

1240 DEFine PROCedure SCRAMBLE
1250 A$="":B$=""
1260 OPEN#3,SCR_:PAPER#3,0
1270 FOR L=0 TO 63:A$=A$&CHR$(32+L):B$=B$&CHR$(32+
L):NEXT L
1280 P=63:M=0
1290 IF INKEY$(0)==" " THEN RETurn
1300 D$=CHR$(192+8*RND(0 TO 3))

```

1310 SHIFT D\$,2

1320 GO TO 1290

1330 END DEFine

```

1340 DEFine PROCedure SHIFT (SP$,SP)
1350 FLG=0
1360 IF SP$=CHR$(192) AND (P MOD 8)=0 THEN RETurn
1370 IF SP$=CHR$(200) AND (P MOD 8)=7 THEN RETurn
1380 IF SP$=CHR$(208) AND (P DIV 8)=0 THEN RETurn
1390 IF SP$=CHR$(216) AND (P DIV 8)=7 THEN RETurn

```

1400 SP2=CODE(SP\$)

1410 SELECT ON SP2

```

1420 =192:SPW3=128:SPW4=32
1430 SPW1=64*((P MOD 8)-1)
1440 SPW2=32*(P DIV 8)
1450 =208:SPW3=64:SPW4=64
1460 SPW1=64*(P MOD 8)
1470 SPW2=32*(P DIV 8)-1
1480 =200:SPW3=128:SPW4=32
1490 SPW1=64*(P MOD 8)
1500 SPW2=32*(P DIV 8)
1510 =216:SPW3=64:SPW4=64
1520 SPW1=64*(P MOD 8)

```

1530 SPW2=32*(P DIV 8)

1540 END SELECT

```

1550 WINDOW#3,SPW3,SPW4,SPW1,SPW2
1560 PAPER#3,2
1570 IF SP$=CHR$(192) AND SP=2 THEN PAN#3,64
1580 IF SP$=CHR$(192) AND SP=1 THEN FOR LL=1 TO 32
:PAN#3,2:NEXT LL
1590 IF SP$=CHR$(200) AND SP=2 THEN PAN#3,-64
1600 IF SP$=CHR$(200) AND SP=1 THEN FOR LL=1 TO 32
:PAN#3,-2:NEXT LL
1610 IF SP$=CHR$(208) AND SP=2 THEN SCROLL#3,32
1620 IF SP$=CHR$(208) AND SP=1 THEN FOR LL=1 TO 32
:SCROLL#3,1:NEXT LL
1630 IF SP$=CHR$(216) AND SP=2 THEN SCROLL#3,-32
1640 IF SP$=CHR$(216) AND SP=1 THEN FOR LL=1 TO 32
:SCROLL#3,-1:NEXT LL
1650 IF SP$=CHR$(192) THEN A$(P+1)=A$(P):A$(P)=CHR
$(95):P=P-1
1660 IF SP$=CHR$(200) THEN A$(P+1)=A$(P+2):A$(P+2)
=CHR$(95):P=P+1
1670 IF SP$=CHR$(208) THEN A$(P+1)=A$(P-7):A$(P-7)
=CHR$(95):P=P-8
1680 IF SP$=CHR$(216) THEN A$(P+1)=A$(P+9):A$(P+9)
=CHR$(95):P=P+8

```

1690 FLG=1

1700 END DEFine

```

1710 DEFine PROCedure PLAY
1720 MVS=0
1730 D$=INKEY$(-1)
1740 IF D$=="S" THEN RETurn
1750 IF D$<>CHR$(192) AND D$<>CHR$(200) AND D$<>CH
R$(208) AND D$<>CHR$(216) THEN GO TO 1730

```

1760 SHIFT D\$,1

1770 MVS=MVS+FLG

```

1780 IF A$<>B$ THEN GO TO 1730
1790 MODE 8
1800 WINDOW 512,256,0,0

```

1810 CSIZE 1,1

1820 CLS

```

1830 AT 5,0:PRINT " YOU HAVE COMPLETED THE PUZZLE,
NUMBER OF MOVES TAKEN:";MVS
1840 FOR L= 1 TO 1000:NEXT L:PAUSE
1850 END DEFine
1860 DEFine PROCedure GRID
1870 MODE 8:OPEN#3,SCR_

```

1880 CSIZE#3,0,1

1890 FOR L=0 TO 63

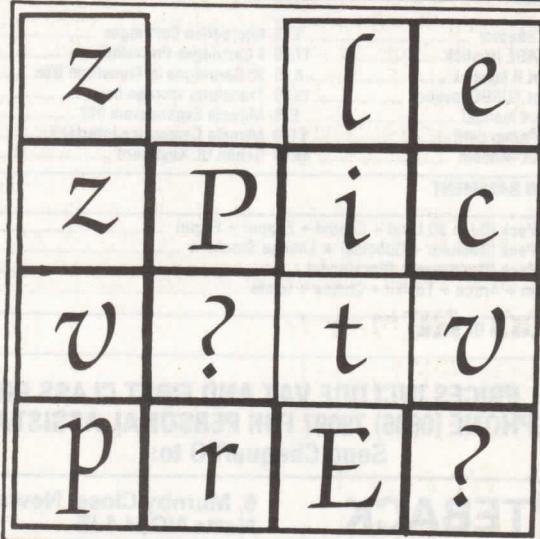
```

1900 WINDOW#3,64,32,64*(L MOD 8),32*(L DIV 8)
1910 BORDER#3,2,7:PAPER#3,3:INK#3,7:CLS#3
1920 IF L<9 THEN CURSOR#3,20,5:ELSE CURSOR#3,15,5
1930 IF L=63 THEN CLR#3:ELSE PRINT#3,L+1

```

1940 NEXT L

1950 END DEFine





VISA

BYTEBACK

THE QL
SPECIALIST

GAMES		ONLY	ADVENTURES		ONLY
Steve Davis Snooker	CDS	12.50	Quill System	Gilsoft	18.00
Bridge Player II	C.P. Soft	17.00	Executive Adv.	Gemini	12.50
3D Slime	Datalink	11.00	Aquanaut 471	Microdeal	17.00
Blocklands	Digital	8.50	Mortville Manor	Pyramide	17.00
Droidzone	Digital	8.50	Nemesis	Talent	12.50
Super Backgammon	Digital	11.00	Zkul	Talent	12.50
Spook	Eiderson	9.00	West	Talent	12.50
Karate	Eiderson	12.50			
BJ in 3D Land	Eiderson	7.00			
BJ The Return	Eiderson	8.00	PROGRAMMING	ONLY	
Citadel	Eiderson	7.00	Supercharge	Digital	42.00
Zapper and Eagle	Eiderson	7.00	Turbo(+ Toolkit)	Digital	84.00
Hyperdrive	English	12.50	Turbo Toolkit	Digital	25.00
Scrabble	L. Genius	12.50	Better Basic	Digital	21.00
Flight	Microdeal	17.00	Superforth	Digital	34.00
Lands of Havoc	Microdeal	17.00	Assembler Dev.Kit	Metacomo	34.00
Chess	Psiom	17.00	Lisp Dev.Kit	Metacomo	49.00
Match Point	Psiom	12.50	C Dev.Kit	Metacomo	79.00
Super Croupier	Pyramide	12.50	BCPL Dev.Kit	Metacomo	49.00
Mister Smith	Pyramide	10.50	Pascal Dev.Kit	Metacomo	75.00
Vroom	Pyramide	12.50	Basic-Ally	Talent	25.00
Wanderer	Pyramide	17.00	Assembler Workbench	Talent	21.00
Othello 3D	Pyramide	17.00			
Knight Flight	Realtime	12.50			
Dragonhold	Rubicon	17.00			
Tank Busters	Sellasoft	12.50	UTILITIES AND BUSINESS	ONLY	
Quboids	Sinclair	8.00	Front Page	Gap	£21
Bounder	Sinclair	8.00	Task Master	Sector	£23
Meteor Storm	Sinclair	8.00	Spellbound	Sector	£27
QL Reversi	Sinclair	8.00	Q Flash	(Epson)	£23
Strip Poker	Talent	12.50	Super Astrologer	Digital	21.00
Oxford Trivia	Talent	15.00	Pro Astrologer	Digital	45.00
Jungle Eddi	Talent	12.50	Super Media Mgr	Digital	34.00
Lost Pharaoh	Talent	12.50	Cart. Media Mgr	Digital	21.00
			The Editor	Digital	25.00
			QL Multi Task	D.S. Ent's	12.50
			Ram Disk	D.S. Ent's	12.50
			ICE	Eiderson	25.00
			Icicle	Eiderson	12.50
			ICE Toolkit	Eiderson	11.00
			Choice	Eiderson	14.50
			Artice	Eiderson	12.50
			Qspell	Eiderson	19.00
			Qspell (disk)	Eiderson	23.00
			Bag of Tricks 1&2	Pyramide	10.00
			Touch Typist	Sector	10.00
			Qimp	Talent	34.00
			Ram Disk/Spooler	Talent	8.50
			Sideways	Talent	17.00
			QL Toolset	Talent	17.00
			Cartridge Doctor	Talent	12.50
			Cosmos	Talent	12.50
			Tasprint	Tasman	18.00
ART AND DESIGN		ONLY			
Datacad QL (for Plotter)	Datakey	9.50			
Cad Pak	Datalink	12.50			
Eye-Q	Digital	25.00			
SuperSite Gen	Digital	25.00			
Sign Designer	D.S. Ent's	16.00			
The Designer	Pyramide	17.00			
Graphic Toolkit	Pyramide	12.50			
Nucleon	Pyramide	17.00			
QL Peintre	Pyramide	12.50			
Viewpoint 3D	Rubicon	17.00			
PCB Designer 1	Talent	85.00			
PCB Designer 2	Talent	85.00			
Graphical Plus	Talent	21.00			
TechniQL	Talent	43.00			
Technikit	Talent	21.00			
HARDWARE		ONLY			
Joystick adaptor		4.25	Microdrive Cartridges		1.75
The ARCADE joystick		17.00	4 Cartridges (in wallet)		7.25
Quickshot II joystick		8.00	20 Cartridges in Transform Box		38.50
Quickshot TURBO joystick		13.00	Transform storage box		4.50
QL Service manual		£19	Miracle Expanderam 512		85.00
Miracle Trump card		£180	Miracle Centronics Interface		18.00
Miracle QL Modem		45.00	Schön QL Keyboard		52.00
BARGAIN BASEMENT		ONLY			
4 Game Pack (BJ in 3D Land + Citadel + Zapper + Eagle)					14.00
2 Game Pack (Bounder + Quboids) ★ Limited Stocks ★					14.00
2 Game Pack (Droidzone + Blocklands)					15.00
ICE eprom + Artice + Toolkit + Choice + Icicle					72.00
Best prices on QL books					

**ALL PRICES INCLUDE VAT AND FIRST CLASS POST
TELEPHONE (0636) 79097 FOR PERSONAL ASSISTANCE
Send Cheque/PO to:**

BYTEBACK

 6, Mumby Close, Newark,
Notts NG24 1JE

PDQL

 Computer
Systems
and
Software

**UNIT 1
HEATON HOUSE
CAMDEN STREET
BIRMINGHAM B1 3BZ
021-233 3042**

MAKE THE MOST OF YOUR QL

for home or business use — Order from list or write for current catalogue, prices include VAT/postage within the UK. Cheques with orders to, and full descriptive list available from, PDQL. Please state details of toolkit, extended memory and/or disc drive.

"If Archive is your interest, then ARCHIVE TUTOR is about the best introduction to the database system available and "SCREEN FORMAT PRINTER will prove a powerful addition to your software library." Sinclair/QL World February 1987.

Sinclair/QL World February 1987.

ARCHIVE TUTOR £21

SCREEN FORMAT PRINTER £7

"...one of the most valuable development utilities I have seen, PDQ-XREF...an indispensable aid..." Sinclair/QL World April 1987

PDQ-XREF £15

"Two specified files compared in separate windows ... indicates mismatches ... needless to say it worked very well ... COMPARE is essential for anyone requiring information concerning their files" Sinclair/QL World May 1987

COMPARE £10

"SEDIT provides a means to create and edit screen format files in Archive ... a very useful utility and exceptionally good value" Sinclair/QL World May 1987

SEDIT £15

The latest version of CASH TRADER UPGRADE is now available — faster, debugged, use any printer, easy back-up — for disc or microdrive — no master boot cartridge — Existing users send their CT Boot cartridge with order; Operates on standard QL or THOR.

Existing users: £39 — New Users: £80

PDQ PAYROLL (new version now available) takes the aches out of weekly or monthly PAYE calculations and reports; disc or microdrive; prints all reports to screen or any printer; Operates on standard QL and THOR: £70

ARCHIVE DATABASE RECOVERY (Archive On The Mend) £20

Support Scheme for CT and PAYROLL — per annum £15

PDQ VAT ACCOUNTS Standard Archive £25

(for ArchDEY users) with Extra Run Time Module £43

PDQ NAME AND ADDRESS Standard Archive £18

(for ArchDEY users) with Extra Run Time Module £36

ArchDEY/RTM £20

MANY OTHER General Utility, Archive Utility and Application systems. NEW systems or adjustments to existing systems built to order. ALL PDQL SuperBASIC programs are now TURBOcharged.

NEW from PDQL

DOMINATION The addictive Strategy Game exclusively from PDQL £9

LIBERATION! for all QL users


THE DEFINITIVE SUPERBASIC COMPILER

* Many unique features * Now faster compilation and faster runtimes. * User configurable front end * Create your own toolkit of resident procedures with full access to parameters. ROMable code * Resident compiler option * Build subroutine libraries * Unique OVERLAY command supports massive programs on 128k QLs. * Automatic integer FOR next loops * All this plus useful new commands, error trapping, channel sharing, PIPES and TOTAL compatibility. * FULLY USABLE ON 128K QL Available on mdv, 3.5 disk and soon on ROM. Upgrades from Rel 2, send master & £9.95

£59.95

ESSENTIAL SUPERBASIC TOOLS

QLOAD QUICK LOADER FOR SUPERBASIC
 No more time for cups of tea while your SuperBASIC program is loading! With QLOAD, absolutely any BASIC program can be loaded within seconds. Full portability across systems and none of the restrictions associated with similar products.

QREF RESIDENT CROSS REFERENCE UTILITY
 Five indispensible procedures give you instant, sorted cross reference lists of one or more procedures, functions, variables or machine code routines. Plus a FIND function for the SuperBASIC editor. QLOAD and QREF are supplied together on mdv for only £1 for 3.5 disk.

£9.95

Prices include VAT & P&P to Europe. SAE for more details. US orders: Sharps Inc, Route 10, Box 459, Mechanicsville, VA2311.


 43 CLIFTON ROAD
KINGSTON UPON THAMES
KT2 6PJ
01-546 7795

PONTOON by H.R. PENDRY

This is the classic game of Pontoon. It features proper card graphics, changing banker — on royal pontoon — full betting,

buying, twisting, sticking and complete scoring, including five-card tricks and so on.

```

100 REMark          PONTOON version I
110 REMark          Copyright Huw Pendry 1986
120 MODE 4
130 WINDOW 448,240,32,16
140 SCALE 256,0,0
150 DIM money(2),card_tot(2),total(2,2),hand(2,5),
suit$(4),numb$(13),str_table(11)
160 set_chars
170 open_pack
180 RESTORE 200
190 FOR i=1 TO 11:READ str_table(i)
200 DATA 4,7,8,9,5,6,3,2,10,1,11
210 REPeat match_loop
220 PAPER 4:INK 0:CLS
230 AT 3,3
240 CSIZE 2,0
250 PRINT "Please enter your name ";
260 STRIP 7
270 POKE 163976,0
280 INPUT name$
290 POKE 163976,1
300 banker=0:stake=0
310 FOR j=1 TO 2:FOR i=1 TO 5:hand(j,i)=0:END FOR
i:END FOR j
320 money(1)=250 : money(2)=250
330 INK 0:STRIP 7:CLS
340 CSIZE 2,0
350 AT 20,17:PRINT name$
360 AT 1,17:PRINT "Computer"
370 out_head
380 out_values
390 REPeat game_loop
400 card_tot(1)=0 : card_tot(2)=0
410 stake=0
420 royal_pontoon=0
430 shuffle_pack
440 pointer=1
450 BLOCK 186,53,178,28,4
460 BLOCK 186,53,178,140,4
470 STRIP 4
480 AT 11,10:PRINT "
490 AT 9,10:PRINT "
500 AT 5,10:PRINT "
510 AT 16,10:PRINT "
520 AT 5,38:PRINT "
530 AT 16,38:PRINT "
540 twist 1,1
550 buy 2,1
560 IF banker=1 THEN
570   comp_choice
580   IF total(2,1)<=21 AND royal_pontoon=0 THEN
player_choice
590   IF total(1,1)<=21 THEN IF total(2,1)<=21 TH
EN twist 2,0:ELSE out_tot 2
600 ELSE
610   player_choice
620   IF total(1,1)<=21 THEN comp_bank
630 END IF
640 update_score
650 STRIP 4:AT 10,25:PRINT "

```

```

660 IF money(1)=0 OR money(2)=0 THEN EXIT game_1
660 oop
670 END REPeat game_loop
680 AT 10,23
690 IF money(1)=0 THEN PRINT "Too Bad, You lose":E
LSE PRINT "Well done, You win!"
700 AT 11,18:PRINT "Do you want another game (Y/N)?
?""
710 REPeat yn_loop
720 a$=INKEY$
730 IF a$="Y" OR a$="N" THEN EXIT yn_loop
740 END REPeat yn_loop
750 IF a$="N" THEN EXIT match_loop
760 END REPeat match_loop
770 STOP
780 :
790 DEFine PROCedure player_choice
800 INK 7:STRIP 4;2,3
810 AT 10,20
820 IF NOT banker THEN PRINT "(B)uy , (T)wist":ELSE
PRINT "(T)wist "
830 AT 11,20:PRINT " or (S)tack "
840 REPeat act_loop
850 REPeat in_loop
860 a$=INKEY$(-1)
870 IF a$="S" OR a$="B" OR a$="T" THEN EXIT in_l
oop
880 END REPeat in_loop
890 IF a$="B" AND NOT banker THEN player_buy
900 IF a$="T" THEN twist 1,1
910 IF NOT banker THEN check_royal 1
920 IF (a$="S" AND (total(1,1)>=16 OR total(1,2)>
=16)) OR total(1,1)>21 OR card_tot(1)=5 THEN EXIT
act_loop
930 END REPeat act_loop
940 IF card_tot(1)=5 AND total(1,1)<22 : AT 16,38:
PRINT "FIVE CARD TRICK"
950 BLOCK 120,20,160,100,4
960 END DEFine
970 :
980 DEFine PROCedure check_royal (wx)
990 LOCAL a
1000 IF total(wx,2)=21 AND card_tot(wx)=2 THEN
1010 a=((hand(wx,1)-1) MOD 13)+1
1020 IF a=1 THEN a=((hand(wx,2)-1) MOD 13)+1
1030 IF a>10 THEN royal_pontoon=1:a$="S"
1040 END IF
1050 END DEFine
1060 :
1070 DEFine PROCedure player_buy
1080 LOCAL bet
1090 REPeat mon_loop
1100 STRIP 4:AT 11,10:PRINT "
1110 STRIP 7:INK 0
1120 AT 11,10:INPUT bet
1130 IF bet<=money(1) AND bet<=money(2) AND bet<5
1 THEN EXIT mon_loop
1140 END REPeat mon_loop
1150 money(1)=money(1)-bet
1160 money(2)=money(2)-bet
1170 stake=stake+2*bet
1180 out_values
1190 twist 1,1
1200 END DEFine
1210 :
1220 DEFine PROCedure comp_bank
1230 IF royal_pontoon=1 THEN RETurn
1240 twist 2,0
1250 a$=""
1260 REPeat i_loop
1270 IF total(2,2)<>0 THEN
1280 IF total(2,2)<16 THEN comp_twist:ELSE gambl
e total(2,2),0
1290 ELSE
1300 IF total(2,1)<16 THEN comp_twist 2,1:ELSE g
amble total(2,1),0
1310 END IF

```

```

1320 IF a$<>"S" THEN out_tot 2
1330 IF total(2,1)>21 THEN EXIT i_loop
1340 INK 0:STRIP 7
1350 IF card_tot(2)=5 THEN a$="S":AT 5,38:PRINT"FOR
IVE CARD TRICK"
1360 INK 7:STRIP 2
1370 IF a$="S" THEN AT 10,25:PRINT"STICK":wait:EX
IT i_loop

```

1380 END REPeat i_loop

1390 END DEFine

1400 :

```
1410 DEFine PROCedure comp_twist
```

```
1420 INK 7:STRIP 2
```

```
1430 AT 10,25:PRINT"TWIST"
```

```
1440 twist 2,1
```

```
1450 STRIP 4
```

```
1460 AT 10,25:PRINT"      "
```

1470 END DEFine

1480 :

```
1490 DEFine PROCedure gamble (score,switch)
```

```
1500 LOCal r
```

```
1510 IF score=21 THEN a$="S":RETurn
```

```
1520 r=RND(0 TO 21)
```

```
1530 IF r>score THEN comp_twist:RETURN
```

```
1540 IF r=score AND switch=1 THEN comp_buy r*3:ELS
E a$="S"
```

```
1550 END DEFine
```

```
1560 :
```

```
1570 DEFine PROCedure comp_choice
```

```
1580 a$=""
```

```
1590 REPeat o_loop
```

```
1600 IF total(2,2)<>0 THEN
```

```
1610 IF total(2,2)<16 THEN comp_buy (RND(1 TO to
tal(2,2)))*3:ELSE gamble total(2,2),1
```

```
1620 ELSE
```

```
1630 IF total(2,1)<16 THEN evaluate:ELSE gamble
```

```
total(2,1),1
```

1640 END IF

1650 check_royal 2

```
1660 IF total(2,1)>21 THEN EXIT o_loop
```

```
1670 INK 0:STRIP 7
```

```
1680 IF card_tot(2)=5 THEN a$="S":AT 5,38:PRINT"FOR
IVE CARD TRICK"
```

```
1690 INK 7:STRIP 2
```

```
1700 IF a$="S" THEN AT 10,25:PRINT"STICK":wait:EX
IT o_loop
```

```
1710 END REPeat o_loop
```

```
1720 END DEFine
```

```
1730 :
```

```
1740 DEFine PROCedure wait
```

```
1750 LOCal i
```

```
1760 FOR i=1 TO 500:END FOR i
```

```
1770 END DEFine
```

```
1780 :
```

```
1790 DEFine PROCedure evaluate
```

```
1800 LOCal k,strength
```

```
1810 IF total(2,1)>11 THEN
```

```
1820 comp_twist
```

```
1830 ELSE
```

```
1840 FOR k=1 TO 11:IF str_table(k)=total(2,1) THE
N strength=k
```

```
1850 comp_buy RND(1 TO strength)*5
```

```
1860 END IF
```

```
1870 END DEFine
```

```
1880 :
```

```
1890 DEFine PROCedure comp_buy (amount)
```

```
1900 STRIP 2:INK 7
```

```
1910 AT 10,25:PRINT" BUY "
```

```
1920 IF amount>50 THEN amount=50
```

```
1930 IF amount>money(1) THEN amount=money(1)
```

```
1940 IF amount>money(2) THEN amount=money(2)
```

```
1950 money(1)=money(1)-amount
```

```
1960 money(2)=money(2)-amount
```

```
1970 stake=stake+2*amount
```

```
1980 STRIP 4
```

```
1990 AT 9,10:PRINT"      "
```

```
2000 STRIP 7:INK 0:AT 9,10:PRINT amount
```

2010 out_values

2020 buy 2,1

```
2030 STRIP 4:AT 10,25:PRINT"      "
```

```
2040 END DEFine
```

```
2050 :
```

```

2060 DEFine PROCedure update_score
2070 LOCal a,b,d,e
2080 IF royal_pontoon=1 THEN
2090   banker=NOT(banker)

```

2100 out_head

```

2110 CSIZE 2,1:INK 0:STRIP 4
2120 AT 5,10
2130 IF banker=1 THEN PRINT"YOU GET THE BANK!!":E
LSE PRINT"I GET THE BANK"
2140 IF banker=1 THEN music 1:win 3:ELSE music 4:
win 4
2150 CSIZE 2,1:INK 0:STRIP 4
2160 PAUSE 50:AT 5,10:PRINT FILL$(" ",18)

```

2170 CSIZE 1,0

2180 ELSE

```

2190 IF total(1,2)<>0 THEN a=total(1,2):ELSE a=to
tal(1,1)
2200 IF a>21 THEN a=0
2210 IF total(2,2)<>0 THEN b=total(2,2):ELSE b=to
tal(2,1)
2220 IF b>21 THEN b=0
2230 d=card_tot(1):e=card_tot(2)
2240 IF d=2 AND a=21 THEN a=50
2250 IF e=2 AND b=21 THEN b=50
2260 IF d=5 AND e>5 AND a<>0 THEN a=100
2270 IF e=5 AND d>5 AND b<>0 THEN b=100
2280 IF a>b OR (a=b AND banker=1) THEN win 1:ELSE
win 2
2290 END IF
2300 END DEFine
2310 :
2320 DEFine PROCedure win (z)
2330 IF z=1 THEN music 2
2340 IF z=2 THEN music 3
2350 IF z>2 THEN z=z-2
2360 money(z)=money(z)+stake
2370 IF stake<>0 THEN stake=0:out_values
2380 END DEFine
2390 :
2400 DEFine PROCedure music (lin_no)
2410 LOCal no_notes,i,a,b,c
2420 RESTORE 2450+(lin_no*10)

```

2430 READ no_notes

```

2440 FOR i=1 TO no_notes:READ a,b,c:BEEP a,b:PAUSE
c
2450 BEEP
2460 DATA 4,1000,20,5,1000,20,5,1000,20,5,2000,10,
10
2470 DATA 3,0,20,5,0,30,5,0,20,5
2480 DATA 2,3000,100,10,5000,200,15
2490 DATA 3,3000,100,10,3000,150,10,5000,200,15
2500 END DEFine
2510 :
2520 DEFine PROCedure twist (x,no_cards)
2530 LOCal down,ts,i,a,flag
2540 IF x=1 THEN down=50:a=143:ELSE down=170:a=31
2550 IF no_cards=0 THEN flag=1:no_cards=card_tot(x):
ELSE flag=0
2560 FOR i=1 TO no_cards
2570 IF flag THEN card_tot(x)=i-1
2580 print_cards 154+(card_tot(x)*10),down,1
2590 IF NOT flag THEN deal x:ELSE tc=hand(x,i)
2600 CSIZE 1,0
2610 ts=((tc-1) DIV 13)+1
2620 IF ts>=3 THEN INK 2:ELSE INK 0
2630 STRIP 7
2640 IF flag THEN card_tot(x)=i
2650 CURSOR 168+(card_tot(x)*12.7),a
2660 PRINT numb$((tc-1) MOD 13)+1)
2670 CURSOR 168+(card_tot(x)*12.7),a+9
2680 PRINT suit$(ts)
2690 IF flag THEN calc_tot x:out_tot x

```

2700 END FOR i

2710 calc_tot x

2720 END DEFine

2730 :

```
2740 DEFine PROCedure buy (x,no_cards)
```

```
2750 LOCal i,down,b
```

```
2760 IF x=1 THEN down=50 : b=146 : ELSE down=170 :
b=33
```

```
2770 FOR i=1 TO no_cards
```

```
2780 print_cards 154+(card_tot(x)*10),down,1
```

```
2790 deal x
```

```

2800 END FOR i
2810 calc_tot x
2820 BLOCK 28,42,175+(card_tot(x)*12.7),b,2,7,3
2830 END DEFine
2840 :
2850 DEFine PROCedure deal (wp)
2860 card_tot(wp)=card_tot(wp)+1
2870 tc=pack(pointer)
2880 hand(wp,card_tot(wp))=tc
2890 pointer=pointer+1
2900 END DEFine
2910 :
2920 DEFine PROCedure calc_tot (w)
2930 LOCal ace,f_tot,i,card_val
2940 ace=0 : f_tot=0
2950 FOR i=1 TO card_tot(w)
2960 card_val=((hand(w,i)-1) MOD 13)+1
2970 IF card_val>10 THEN card_val=10
2980 f_tot=f_tot+card_val
2990 IF card_val=1 THEN ace=1
3000 END FOR i
3010 total(w,1)=f_tot
3020 IF ace<>0 AND f_tot<=11 THEN total(w,2)=f_tot
+10:ELSE total(w,2)=0
3030 IF w=1 THEN out_tot 1
3040 END DEFine
3050 :
3060 DEFine PROCedure out_tot (wx)
3070 LOCal h
3080 STRIP 4
3090 IF wx=1 THEN h=16:ELSE h=5
3100 AT h,10:PRINT FILL$(" ",8)

3110 INK 0:STRIP 7
3120 AT h,10:PRINT total(wx,1);
3130 IF total(wx,1)>21 THEN PRINT" BUST"
3140 IF total(wx,2)<>0 THEN PRINT" or"!total(wx,2)
3150 END DEFine
3160 :
3170 DEFine PROCedure left_side (xco,yco)
3180 LINE xco,yco
3190 LINE_R TO -10,0 TO -3,3 TO 0,50 TO 3,3 TO 10,
0
3200 END DEFine
3210 :
3220 DEFine PROCedure right_side (xco,yco)
3230 LINE xco,yco
3240 LINE_R TO 20,0 TO 3,3 TO 0,50 TO -3,3 TO -21,
0
3250 END DEFine
3260 :
3270 DEFine PROCedure print_cards (across,down,no_
cards)
3280 INK 7
3290 FILL 1
3300 draw_cards across,down,no_cards
3310 INK 0
3320 FILL 0
3330 draw_cards across,down,no_cards
3340 END DEFine
3350 :
3360 DEFine PROCedure draw_cards (across,down,no_c
ards)
3370 LOCal i
3380 FOR i=across TO (no_cards-1)*10+across STEP 1
0
3390 left_side i,down
3400 END FOR i
3410 right_side i,down
3420 END DEFine
3430 :
3440 DEFine PROCedure out_head
3450 CSIZE 1,0

```

```

3450 CSIZE 1,0
3460 INK 3 : STRIP 7
3470 AT 2,8
3480 IF banker=0 THEN PRINT"BANKER":ELSE PRINT"PUN
TER"
3490 AT 19,8
3500 IF banker=1 THEN PRINT"BANKER":ELSE PRINT"PUN
TER"
3510 INK 0:STRIP 4
3520 AT 4,2:PRINT" MONEY "
3530 AT 17,2:PRINT" MONEY "
3540 AT 5,2:PRINT" TOTAL ="
3550 AT 16,2:PRINT" TOTAL ="
3560 AT 9,2:PRINT" BET "
3570 AT 10,2:PRINT" STAKE "
3580 AT 11,2:PRINT" BET "
3590 END DEFine
3600 :
3610 DEFine PROCedure out_values
3620 INK 0:STRIP 4:CSIZE 1,0
3630 AT 4,10:PRINT" "
3640 AT 17,10:PRINT" "
3650 AT 10,10:PRINT" "
3660 STRIP 7
3670 AT 4,10:PRINT money(2)
3680 AT 17,10:PRINT money(1)
3690 AT 10,10:PRINT stake
3700 END DEFine
3710 :
3720 DEFine PROCedure open_pack
3730 LOCal i
3740 DIM pack (52)
3750 FOR i=1 TO 52 : pack(i)=i
3760 END DEFine
3770 :
3780 DEFine PROCedure shuffle_pack
3790 LOCal j,a,b,z
3800 FOR j=1 TO 50
3810 a=RND(1 TO 52)
3820 b=RND(1 TO 52)
3830 z=pack(a)
3840 pack(a)=pack(b)
3850 pack(b)=z
3860 END FOR j
3790 LOCal j,a,b,z
3800 FOR j=1 TO 50
3810 a=RND(1 TO 52)
3820 b=RND(1 TO 52)
3830 z=pack(a)
3840 END DEFine
3850 :
3860 DEFine PROCedure set_chars
3900 LOCal i,byte
3910 st_addr=RESPR(100)
3920 reg_a0=65537
3930 reg_a2=st_addr+6
3940 RESTORE 4060
3950 FOR i=0 TO 61:READ byte:POKE st_addr+i,byte
3960 CALL st_addr,0,0,255,37,0,0,0,reg_a0,0,reg_a2
3970 FOR i=1 TO 4:suit$(i)=CHR$(i+127)
3980 numb$(1)=CHR$(132)
3990 FOR i=2 TO 9:numb$(i)=i
4000 numb$(10)=CHR$(133)
4010 numb$(11)="J"
4020 numb$(12)="Q"
4030 numb$(13)="K"
4040 END DEFine
4050 :
4060 REMark machine code - 6 bytes
4070 DATA 32,4,78,67,78,117
4080 :
4090 REMark data - 2 bytes
4100 DATA 128,5
4110 :
4120 REMark character patterns -
4130 REMark 9 bytes per char
4140 DATA 8,28,62,127,127,107,8,8,0
4150 DATA 28,28,8,107,127,107,8,8,0
4160 DATA 0,231,255,255,126,60,24,0,0
4170 DATA 8,28,62,127,62,28,8,0,0
4180 DATA 24,24,36,36,126,66,66,0,0
4190 DATA 76,82,82,82,82,82,76,0,0

```

Qram

AT LAST!!

A completely new QL environment for every expanded QL

- ★ ★ ★ Non-destructive windows
- ★ ★ ★ Single key pop-up menus
- ★ ★ ★ Full multitasking
- ★ ★ ★ Super-fast RAM disk
- ★ ★ ★ Dynamic printer buffer
- ★ ★ ★ Multi-mode screen dumps



Qram is suitable for all QL's with at least 256 kilobytes of RAM.

Qram RAM based utilities
QTK II Super Toolkit II
Qmon II Monitor/debugger
QEP III EPROM programmer

Prices include VAT

Please add £1.00 pp UK

there's nothing like it
 the original QL toolkit
 the one we use ourselves
 worth £1000s, but only

	Mdv	3½	5¼	ROM
£29.90	●	●	●	
£29.90	●	●	●	●
£19.95	●	●	●	
£129.95				

QJUMP LTD
 24 KING STREET RAMPTON
 CAMBRIDGE CB4 4QD
 Tel: Cottenham (0954) 50800

TRANSFORM LTD. Computer Accessories

MAIL LIST

£24.95

Allows you to retrieve names & addresses from within ARCHIVE. Other features include single key functions, prints address labels, exports files to Quill also compatible with our stock control.

STOCK CONTROL

£24.95

Keeps records of all stock items including retail price, trade price, minimum order level, items on order & many other features.

QL SWITCH

£14.95

Allows users with extra memory to run Quill, Archive, Abacus & Easel at the same time or two Archive programs & Quill.

DOT MATRIX

Citizen 1200 £209.00
 Seikosha SP180 A £208.85
 Epson LX 86 £247.25
 Taxan Kaga £287.50

DAISYWHEEL

Brother HR20 daisy wheel £495.00

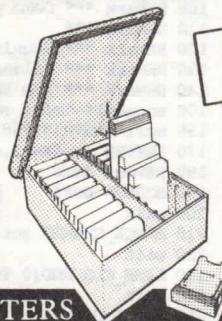
ACCESSORIES

LX tractor feed £20.70

We also stock ribbons for the above printers.
 Please add £5.75 for delivery of printers & monitors.

MICRODRIVE STORAGE BOX

£4.95
 Single Box



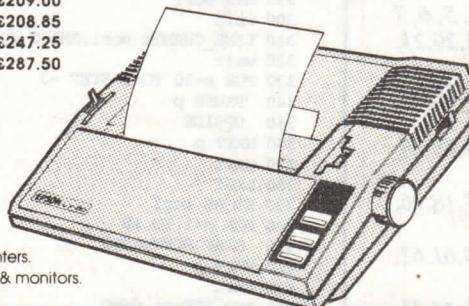
Box + 10 cartridges
 £22.45

Box + 20 cartridges
 £39.95

Please add £1.30
 p&p

PRINTERS

LX 86 215.00 +vat



PC FOUR

A cut-down version of Xchange as supplied on the QL but with the added facility of 65,535 entries in Archive, 999 lines in Abacus & mail merge plus key define built into Quill.

QL to PC £29.95

PSION XCHANGE

ARCHIVE DATABASE

Multiple relational database. Only memory restricts the number of files in use at one time. Variable length records with a maximum of 255 characters per field, 255 fields per record, 65535 records per file. Command language allows the user to define procedures using a powerful editor. Flexible multifile indices provide fast access and a form designer for screen and printer input and output.

QUILL WORDPROCESSOR

Text and page formatting, underlining, bold, italic, superscript, subscript, justification, tabs, line spacing, page size, page headers, footers and numbering. On screen editing, fast page access, cut and paste, block copy, block move, insert/overwrite modes, search and find, search and replace, key define and mail merge. Document size only restricted by disk capacity, background printing, allows the user to print documents while working on others.

£295
 INC. VAT

EASEL BUSINESS GRAPHICS

3D Business graphics including bar, line and pie charts, no limit to the number of values or numbers or sets of figures. Automatic rescaling, user define colours, text annotation of graphs at any pixel point. Intelligent evaluation of data formulae or manipulation of existing data. Images stored in internal format; monitor resolution is the only limit on final image quality. Accepts data from spreadsheet, database, etc.

ABACUS SPREADSHEET

Expansive spreadsheet with 999 rows, 255 columns, virtual memory system buffers to disk only when full, facilitating very large spreadsheets. Efficiency memory used only for full cells, each cell only uses 14 bytes. Variable width cells, block copy, block move, insert/ delete columns and rows, merge and consolidation of data from different spreadsheets. Accurate to 15 significant figures, full range of mathematical, scientific, date, average, ASCII and DIF conversion.

PC FOUR £79.35



TRANSFORM LTD (DEPT. QL) 01-658 6350
 Mail order only. 24 West Oak, Beckenham, Kent. BR3 2EZ



NOW! INTERNAL MOUSE
 INTERFACE PLUS HIGH
 QUALITY MOUSE
 * QRAM £89.90

Program of the month

Video Effects Box 1

Robert Noble

The Video Effects Box 1 adds nine procedures and a function to SuperBasic. The procedures enable the user to manipulate screens in memory with ease. The procedures are as follows:

SCREEN (address) moves the screen at (address) into the display memory.

STORE (address) stores the display memory at (address).

SWAP (address1), (address2). Swaps the screen at (address1) with that at (address2).

UPSIDE Turns the displayed picture upside-down.

MIX (address). The same as SCREEN, except that the screen at (address) is Exclusive-ORed on to the screen. After MIXing a screen on to the display, MIX it again to leave the original picture as before.

BLOCK CLS (pattern), (speed). Clears the display by blanking one block of an 8 x 8 grid at a time. The speed can be anything from 1 to 32767, 1 being the fastest. The pattern selects the order in which the blocks are cleared — see below.

BLOCK CHANGE (address), (pattern), (speed). Basically the same as BLOCK CLS except that the display changes into the screen held at (address) instead of just clearing.

LINE CLS (pattern), (speed). A variation on the BLOCK commands where the screen clears one horizontal line at a time.

LINE CHANGE (address), (pattern), (speed). As BLOCK CHANGE but with horizontal lines instead of blocks.

The function is:

SCRN. SCRN returns the number 131072, which is the address of the display in memory. SCRN

can be used as the address in any command to use the visible screen, e.g., SWAP 250000,SCRN would swap the screen at address 250000 with the displayed screen.

Different patterns for the BLOCK CLS, BLOCK CHANGE, LINE CLS and LINE CHANGE commands can be added easily. At the end of the code are three portions of 64 bytes which make up the three patterns you can use with the program as it is. Each byte represents a block or a line, depending on which command you use. Figure one shows how the bytes relate to the position of the blocks on the screen and figure two the position of the lines.

To add a new pattern you poke the numbers 0 to 63 into memory in the order you want the block/lines to change. The 64 bytes should be poked into memory directly after the code start address+978. If you wanted the BLOCK CLS command to clear the blocks in the order shown in figure three, you should use this program:

10 a=RESPR (978+64)
 11 REMark reserve memory for code & pattern
 20 LEBYTES MDVI Video code,a
 30 FOR l=0 to 63
 40 READ n
 50 POKE a+978+l,n
 60 NEXT l
 70 SBYTES MDVI New code, a,978+64
 80 REMark Now comes the 64 bytes
 100 DATA 0, 1, 2, 3, 4, 5, 6, 7
 110 DATA 15,14,13,12,20,21,
 22,30
 120 DATA 29,28,27,19,11,10,
 9,8
 130 DATA 16,24,32,40,48,56,
 57,49
 140 DATA 41,33,25,17,18,26,
 34,42
 150 DATA 50,58,59,60,61,62,
 54,46
 160 DATA 45,53,52,51,43,35,
 36,44
 170 DATA 37,38,39,31,23,47,
 55,63

The new pattern will be number 3, so try:

BLOCK CLS 3,10000

0 1 2 3 4 5 6 7
8 9 10 11 12 13 14 15
16 17 18 19 20 21 22 23
24 25 26 27 28 29 30 31
32 33 34 35 36 37 38 39
40 41 42 43 44 45 46 47
48 49 50 51 52 53 54 55
56 57 58 59 60 61 62 63

Figure 1

Line 1
Line 2
Line 3
↓ ↓
Line 61
Line 62
Line 63

Figure 2

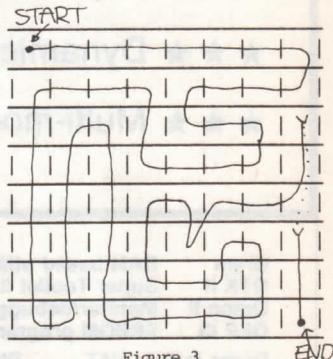


Figure 3

Listing 1.

```

100 REMark *** Demo program for Video Effects Box 1 ***
110 REMark *** Robert Noble ***
120 REMark *** Requires two screens on microdrive. ***
130 REMark *** Filenames of screens held in line 150 ***
140 REMark *** Run BASIC_loader before this program ***
150 screen1$="mdv1_scr1":screen2$="md1_scr2"
160 scr1=RESPR(32768):scr2=RESPR(32768)
170 LBYTES screen1$,scr1:LBUTES screen2$,scr2
180 REPeat demo
190 SCREEN scr1
200 wait
210 BLOCK_CHANGE scr2,RND(0 TO 2),10000
220 wait
230 LINE_CLS RND(0 TO 2),10000
240 wait
250 BLOCK_CHANGE scr1,RND(0 TO 2),5000
260 wait
270 MIX scr2
280 wait
290 MIX scr1
300 wait
310 LINE_CHANGE scr1,RND(0 TO 2),500
320 wait
330 FOR p=50 TO 1 STEP -3
340 PAUSE p
350 UPSIDE
360 NEXT p
370 wait
380 LIST
390 STORE scr1
400 FOR p=1 TO 10
410 SWAP SCRn,scr2
420 NEXT p
430 wait
440 END REPeat demo
450 DEFine PROCEDURE wait
460 PAUSE 100
470 END DEFine

```

P + R = G < S

```

100 REMark *** BASIC LOADER FOR VIDEO EFFECTS BOX 1 ***
110 REMark *** Robert Noble ***
120 a=RESPR(978)
130 c=0
140 FOR z=1000 TO 1480 STEP 10
150 tot=0
160 FOR x=1 TO 10
170 READ p
180 tot=tot+p
190 POKE W a+c,p
200 c=c+2
210 NEXT x
220 READ check:IF check<>tot THEN PRINT "ERROR IN LINE ";z:STOP
230 NEXT z
240 SBYTES mdv1_video_code,a,978
1000 DATA 17402,10,13432,272,20114,20085,9,110,1619,17234,90287
1010 DATA 17733,19968,142,1107,22337,20480,178,1363,21583,21061,125952
1020 DATA 212,1621,20563,18756,17664,244,845,18776,282,2370,81333
1030 DATA 19535,17227,24387,19539,378,3138,19535,17227,24387,18497,163850
1040 DATA 20039,17664,486,2124,18766,17759,17228,21248,558,2892,118764
1050 DATA 18766,17759,17224,16718,18245,0,1,630,1107,17234,107684
1060 DATA 19968,0,13432,280,20114,26144,28913,3139,1,26136,138127
1070 DATA 8822,-26624,8252,0,8191,8316,2,0,8409,20936,36304
1080 DATA -4,17024,20085,13432,280,20114,26146,28913,3139,2,129131
1090 DATA 26138,8310,-26624,8822,-26620,8252,0,8191,8720,8401,23590
1100 DATA 8897,20936,-8,17024,20085,13432,280,20114,26144,28913,155817
1110 DATA 3139,1,26136,8822,-26624,8316,2,0,8252,0,28044
1120 DATA 8191,8920,20936,-4,17024,20085,8316,2,0,8828,92298
1130 DATA 2,32640,12348,127,29215,9232,8401,8898,20937,-8,121792
1140 DATA -27652,0,256,20936,-20,17024,20085,13432,280,20114,64455
1150 DATA 26146,28913,3139,1,26138,8822,-26624,8252,0,8191,82978
1160 DATA 8316,2,0,8729,-19560,20936,-6,17024,20085,13432,68958
1170 DATA 280,20114,26210,28913,3139,2,26202,10806,-26624,10294,99336
1180 DATA -26620,28910,3204,0,32767,28232,-4787,16890,410,-11835,67171
1190 DATA 28735,17025,4632,5121,513,7,514,56,-5814,-5302,45487
1200 DATA -5815,-11710,12865,-11268,2,0,13884,31,17049,17049,32087
1210 DATA 17049,17049,-11524,112,20939,-14,12804,20937,-2,20936,98286
1220 DATA -58,17024,20085,13432,280,20114,26226,28913,3139,3,129158
1230 DATA 26350,9334,-26624,10806,-26620,10294,-26616,28910,3204,0,9038
1240 DATA 32767,28244,16890,300,-4787,-11835,28735,17025,4632,5121,117092
1250 DATA 513,7,514,56,-5814,-5302,-5815,-11710,8828,2,-18721
1260 DATA 0,30239,9138,4096,4096,9138,4100,4100,9138,4104,78149
1270 DATA 4104,9138,4108,4108,1601,128,20939,-30,12804,20937,77837
1280 DATA -2,20936,-70,17024,20085,13432,280,20114,26186,28913,146898
1290 DATA 3139,2,26178,10806,-26624,10294,-26620,28910,3204,0,29289
1300 DATA 32767,28208,-4787,16890,178,-11835,28735,17025,4632,-7863,103950
1310 DATA -7351,12865,-11268,2,0,13884,127,17049,20939,-4,46243
1320 DATA 12804,20937,-2,20936,-34,17024,20085,13432,280,20114,125576
1330 DATA 26192,28913,3139,3,26184,9334,-26624,10806,-26620,10294,61621
1340 DATA -26616,28910,3204,0,32767,28210,16890,92,-4787,-11835,66835
1350 DATA 28735,17025,4632,-7863,-7351,8828,2,0,30335,9138,83481
1360 DATA 4096,4096,22593,20939,-10,12804,20937,-2,20936,-36,106353
1370 DATA 17024,20085,8814,88,13432,282,29190,20114,23881,11593,144503
1380 DATA 88,15804,2066,-26624,15804,16384,-26622,15804,0,-26620,-13916
1390 DATA 30722,17024,20085,4644,12814,7713,13588,560,9737,8747,125634
1400 DATA 1071,15166,2840,1563,13369,10504,5660,5407,3097,9532,68209
1410 DATA 11537,263,6666,16168,5901,10040,10810,11779,13824,15621,102609
1420 DATA 14096,4908,7456,12595,8975,6940,9251,8730,4627,5141,82719
1430 DATA 7461,11564,11050,10529,6417,2314,2828,3342,5662,9774,70941
1440 DATA 13877,13363,12849,12328,8216,4104,1,515,1029,1543,67825
1450 DATA 3863,7975,12087,16190,15676,15162,14648,8,258,2320,88187
1460 DATA 6161,2563,1035,4633,8232,8474,4876,1286,3348,6946,47554
1470 DATA 10544,14385,10787,7189,3591,3862,7460,11058,14650,13100,96626
1480 DATA 9502,5919,9773,13371,15413,11815,12086,15678,14143,-24854,82846

```



P + R O G S

```

; **** Video Effects Box 1 ****
; * 1986 Robert Noble *
; * June 1986 *
; ****

ERR_BP EQU -15
ERR_OR EQU -4
ERR_OV EQU -18
NO_OF_PATS EQU 2
RET_FP EQU 2
BV_CHRIX EQU $11A
BV_RIP EQU $58
CA_GTLIN EQU $118
BP_INIT EQU $110

DEFFPROC LEA.L PROCS,A1 ;initialize BASIC
MOVE.W BP_INIT,A2 ;procedures
JSR RTS

PROCS DC.W 9 ;no. of procedures

DC.W MOV_SCR-* ;offset to start of procedure
DC.B 6 ;length of name
DC.B 'SCREEN' ;name bytes

ALIGN ;keep on word boundary

DC.W SWP_SCR-* ;same as above
DC.B 4
DC.B 'SWAP'

ALIGN

DC.W STR_SCR-* ;same as above
DC.B 5
DC.B 'STORE'

ALIGN

DC.W UPSIDE-* ;same as above
DC.B 6
DC.B 'UPSIDE'

ALIGN

DC.W MIX-* ;same as above
DC.B 3
DC.B 'MIX'

ALIGN

DC.W BLK_CLS-* ;same as above
DC.B 9
DC.B 'BLOCK_CLS'

ALIGN

DC.W BLK_CHG-* ;same as above
DC.B 12
DC.B 'BLOCK_CHANGE'

ALIGN

DC.W LIN_CLS-* ;same as above
DC.B 8
DC.B 'LINE_CLS'

ALIGN

DC.W LIN_CHG-* ;same as above
DC.B 11
DC.B 'LINE_CHANGE'

ALIGN

DC.W 0 ;end of procedures
DC.W 1 ;no. of functions

DC.W SCR_VAL-* ;same as above
DC.B 4
DC.B 'SCRN'

ALIGN

DC.W 0 ;end of functions

```

;code for SCREEN command

```

MOV_SCR MOVE.W CA_GTLIN,A2 ;get argument
JSR (A2) ;long int format
BNE.S EXIT1 ;exit if error

;check there is one
;parameter
;get param. from stack
;loop, to transfer screen
;from address passed to
;proc to screen RAM

LOOP MOVE.L 0(A6,A1.L),A1
MOVE.L #8191,D0
MOVE.L #131072,A0
MOVE.L (A1)+,(A0)+DBF D0,LOOP

CLR.L D0 ;clear D0 - no errors
EXIT1 RTS ;return to BASIC

;code for SWAP command

SWP_SCR MOVE.W CA_GTLIN,A2 ;get arguments
JSR (A2) ;long int. format
BNE.S EXIT2 ;exit if error

;should be two params.
;exit if not.
;get first address from stack
;get second " "
;loop through screen RAM
;store value from first screen
;put value from second into first
;put stored value in second screen
;go back for next long word

LOOP2 MOVE.L 0(A6,A1.L),A0
MOVE.L 4(A6,A1.L),A1
MOVE.L #8191,D0
MOVE.L (A0),D1
MOVE.L (A1),(A0)+DBF D1,(A1)+D0,LOOP2

CLR.L D0 ;no errors
EXIT2 RTS ;return

;code for STORE command

STR_SCR MOVE.W CA_GTLIN,A2 ;get params.
JSR (A2) ;as long integers
BNE.S EXIT3 ;error?

;should be just one
;not one?
;take param. from stack
;A0 equals beginning of screen RAM
;loop through screen
;moving screen to supplied address
;next

LOOP3 MOVE.L 0(A6,A1.L),A1
MOVE.L #131072,A0
MOVE.L #8191,D0
MOVE.L (A0)+,(A1)+DBF D0,LOOP3

CLR.L D0 ;no error
EXIT3 RTS ;return

;code for UPSIDE command

UPSIDE MOVE.L #131072,A0 ;A0 equals beginning of first line of
MOVE.L #163712,A1 ;screen, A1 equals begin. of last line
MOVE #127,D0 ;loop from top to middle of screen
OLOOP4 MOVEQ #31,D1 ;loop from left to right of line
LOOP4 MOVE.L (A0),D2 ;swap data from top line
MOVE.L (A1),(A0)+DBF D2,(A1)+D1,LOOP4
MOVE.L #256,A1 SUB.L #256,A1
DBF D0,OLOOP4 ;with that at the bottom

;do the rest of the line
;come up a line
;do the next line

CLR.L D0 ;no errors
EXIT4 RTS ;ret.

;code for MIX procedure

MIX MOVE CA_GTLIN,A2 ;get long integer
JSR (A2)
BNE.S EXIT10 ;exit if an error
MOVEQ #ERR_BP,D0 ;error bad param.
CMP.W #1,D3 ;should be just one param.
BNE.S EXIT10 ;return if not just one.
MOVE.L 0(A6,A1.L),A1 ;get param into A1
MOVE.L #8191,D0 ;loop 8191 times (the size of the
MOVE.L #131072,A0 ;screen in long words)
LOOP10 MOVE.L (A1)+,D1 ;get long word from second screen
EOR.L D1,(A0)+DBF D0,LOOP10 ;exclusive or onto the screen
;next

CLR.L D0 ;no errors
EXIT10 RTS ;return to BASIC

;code for BLOCK_CLS command

BLK_CLS MOVE CA_GTLIN,A2 ;get params.
JSR (A2) ;as long ints.
BNE.S EXIT6 ;error?

;two params. please
;not two params?
MOVE.L 0(A6,A1.L),D5 ;get first param. (pattern)

```

PROGS

```

MOVE.L 4(A6,A1.L),D4 ;get second param. (speed)
MOVEQ #ERR_OV,D0 ;check speed is less
CMP.L #32767,D4 ;than 32768

BGT.S EXIT6
LSL #6,D5 ;multiply pattern by 64 (each pattern
;takes 64 bytes in memory)

LOOP6 LEA.L ORDER,A0 ;A0 equals beginning of patterns
ADD.L D5,A0 ;add pattern offset
MOVEQ #63,D0 ;loop through 64 blocks
CLR.L D1 ;make sure D1 is clear
MOVE.B (A0)+,D1 ;get block number
;
AND.B #7,D1 ;These calculations
AND.B #56,D2 ;take the block
LSL #4,D2 ;number and work
LSL #5,D2 ;out the address
LSL #4,D1 ;in screen memory
ADD.D D2,D1 ;that the blank
MOVE D1,A1 ;block should be.
ADD.L #131072,A1 ;add the beginning of screen RAM
MOVE #31,D3 ;block is 32 lines down

BLOOP6 CLR.L (A1)+ ;clear 16 bytes
CLR.L (A1)+ ;on this line
CLR.L (A1)+ ;
ADD #112,A1 ;next line
DBF D3,BLOOP6 ;go back for next line
MOVE D4,D1 ;loop round speed
DBF D1,* ;number of times
DBF D0,LOOP6 ;blank the next block

CLR.L D0 ;no errors
EXIT6 RTS ;return to BASIC

```

;code for BLOCK_CHANGE command

```

BLK_CHG MOVE CA GTLIN,A2 ;this code is the same
JSR (A2) ;as that for BLOCK_CLS
BNE.S EXIT7 ;except that there are
MOVEQ #ERR_BP,D0 ;three parameters
CMP.W #3,D3 ;tested for in this line
BNE.S EXIT6
MOVE.L 0(A6,A1.L),A2 ;and also the address of the second
MOVE.L 4(A6,A1.L),D5 ;screen is taken off the stack
MOVE.L 8(A6,A1.L),D4 ;from this line
MOVEQ #ERR_OV,D0 ;the rest is the same
CMP.L #32767,D4 ;as before
BGT.S EXIT7
LEA.L ORDER,A0
LSL #6,D5
ADD.L D5,A0
MOVEQ #63,D0
CLR.L D1
MOVE.B (A0)+,D1
MOVE.B D1,D2
AND.B #7,D1
AND.B #56,D2
LSL #4,D2
LSL #5,D2
LSL #4,D1
ADD D2,D1
MOVE.L #131072,A1
MOVEQ #31,D3

```

```

BLOOP7 MOVE.L 0(A2,D1.W),0(A1,D1.W) ;except for here where
MOVE.L 4(A2,D1.W),4(A1,D1.W) ;the memory is copied from
MOVE.L 8(A2,D1.W),8(A1,D1.W) ;the address passed to the
MOVE.L 12(A2,D1.W),12(A1,D1.W) ;proc instead of being
ADD #128,D1 ;cleared
DBF D3,BLOOP7
MOVE D4,D1
DBF D1,* ;number of times
DBF D0,LOOP7

CLR.L D0
EXIT7 RTS

```

;code for LINE_CLS procedure

```

LIN_CLS MOVE CA GTLIN,A2 ;get long integers
JSR (A2) ;from BASIC
BNE.S EXIT8 ;error?
MOVEQ #ERR_BP,D0 ;error bad parameter
CMP.W #2,D3 ;should be 2 params.
BNE.S EXIT8 ;exit if not
MOVE.L 0(A6,A1.L),D5 ;get first param.
MOVE.L 4(A6,A1.L),D4 ;get second
MOVEQ #ERR_OV,D0 ;error overflow
CMP.L #32767,D4 ;make sure speed
BGT.S EXIT8 ;is less than 32768
LSL #6,D5 ;multiply pattern by 64
LEA.L ORDER,A0 ;A0 = start of patterns
ADD.L D5,A0 ;go forward to start of correct pattern
MOVEQ #63,D0 ;loop 64 times
CLR.L D1 ;clear D1, just in case

```

```

MOVE.B (A0)+,D1 ;get line number
LSL #8,D1 ;these lines work
LSL #1,D1 ;out the screen
MOVE D1,A1 ;address of the
ADD.L #131072,A1 ;start of the line.
MOVE #127,D3 ;
LLOOP8 CLR.L (A1)+ ;loop to clear the line
DBF D3,LLOOP8 ;
MOVE D4,D1 ;loop for the
DBF D1,* ;delay
DBF D0,LLOOP8 ;go back for next line

CLR.L D0 ;no errors
EXIT8 RTS ;return to BASIC

;code for LINE_CHANGE procedure

LIN_CHG MOVE CA GTLIN,A2 ;Get long integers
JSR (A2) ;
BNE.S EXIT9 ;exit if an error
MOVEQ #ERR_BP,D0 ;error bad param.
CMP.W #3,D3 ;3 params. ?
BNE.S EXIT9 ;exit if so
MOVE.L 0(A6,A1.L),A2 ;get first param. (address of screen)
MOVE.L 4(A6,A1.L),D5 ;get second param. (pattern no.)
MOVE.L 8(A6,A1.L),D4 ;get third param. (speed)
MOVEQ #ERR_OV,D0 ;error overflow
CMP.L #32767,D4 ;speed less than 32768
BGT.S EXIT9 ;exit if not
LEA.L ORDER,A0 ;A0 = start of patterns
LSL #6,D5 ;pattern no. * 64
ADD.L D5,A0 ;A0 = correct pattern
MOVEQ #63,D0 ;64 lines to change
LOOP9 CLR.L D1 ;clear D1
MOVE.B (A0)+,D1 ;get line no.
LSL #8,D1 ;Work out
LSL #1,D1 ;the address in memory
MOVE.L #131072,A1 ;on the screen
MOVEQ #127,D3 ;128 long words to change
LLOOP9 MOVE.L 0(A2,D1.W),0(A1,D1.W) ;transfer screen data
ADDQ #4,D1 ;
DBF D3,LLOOP9 ;go back for rest of line
MOVE D4,D1 ;delay is held in d4
DBF D1,* ;
DBF D0,LOOP9 ;next line

CLR.L D0 ;no errors
EXIT9 RTS ;return to BASIC

```

;code for SCRn function

```

SCR_VAL MOVE.L BV_RIP(A6),A1 ;put stack pointer in A1
MOVE.W BV_CHRIX,A2 ;reserve some space
MOVEQ #6,D1 ;on the arithmetic
JSR (A2) ;stack
SUBQ #6,A1 ;move the pointer
MOVE.L A1,BV_RIP(A6) ;tell BASIC about new position
MOVE.W #2066,0(A6,A1.L) ;put three words on
MOVE.W #16384,2(A6,A1.L) ;stack which make
MOVE.W #0,4(A6,A1.L) ;up 131072 when put together
MOVEQ #RET_FP,D4 ;select return type

CLR.L D0
EXIT RTS

```

PH_MEM

;data for the order the blocks/lines change in BLOCK_CLS,
;BLOCK_CHANGE, LINE_CLS and LINE_CHANGE.

ORDER	DC.B 18,36,50,14,30,33,53,20,2,48
	DC.B 38,9,34,43,4,47,59,62,11
	DC.B 24,6,27,52,57,41,8,22
	DC.B 28,21,31,12,25,37,60,45,17
	DC.B 1,7,26,10,63,40,23,13,39
	DC.B 56,42,58,46,3,54,0,61,5,55
	DC.B 16,19,44,29,32,49,51,35,15
ORDER2	DC.B 27,28,36,35,34,26,18,19
	DC.B 20,21,29,37,45,44,43,42
	DC.B 41,33,25,17,9,10,11,12,13
	DC.B 14,22,30,38,46,54,53,52
	DC.B 51,50,49,48,40,32,24,16
	DC.B 8,0,1,2,3,4,5,6,7,15,23
	DC.B 31,39,47,55,63,62,61,60
	DC.B 59,58,57,56
ORDER3	DC.B 0,8,1,2,9,16,24,17,10,3
	DC.B 4,11,18,25,32,40,33,26
	DC.B 19,12,5,6,13,20,27,34,41
	DC.B 48,56,49,42,35,28,21,14
	DC.B 7,15,22,29,36,43,50,57
	DC.B 58,51,44,37,30,23,31,38
	DC.B 45,52,59,60,53,46,39,47
	DC.B 54,61,62,55,63

MICRODRIVE

THE PROGRAMS

Author	Language	Program Name	Price
1. Giles Todd	B	DIY Assembler	£5

Featured in the March to June 1985 issues of *QL User*, this complete two-pass assembler will assemble all 68008 code and support the assembler directives DRG, END, EQU, DC and DS.

2. Richard	A+O	Mini Monitor Cross	£3
------------	-----	--------------------	----

Using approximately 3K of RAM, this handy utility will multi-task on your QL, leaving plenty of room for other programs. Commands include dumping registers, memory — and ASCII — machine code trace, register store, memory move, memory store — byte, word and long — and jumps. Featured in *QL User*, October 1985.

3. A Didcock	B	Connect4	£1
A SuperBasic version of the classic four-in-a-row game where counters drop down slots in the vertical board. First printed in <i>QL User</i> , September 1985.			

4. Shergold	B	Golf & Tose	£2
-------------	---	-------------	----

With up to 50 courses of varying difficulty, lakes, rivers, bunkers and trees, this is a fine golf simulation. You decide the power and direction of each stroke, striving for a birdie, eagle or even an albatross. Your scorecard may be saved. This program was printed in the May 1985 issue of *QL User*.

5. Williams	A+O	Paladin & Holliday	£5
-------------	-----	--------------------	----

Written completely in machine code, this excellent *Space Invaders* game was the basis of our games programming series, started in April 1985.

6. Richard	M+B	Sprite Animation	£2
------------	-----	------------------	----

This contains two programs from the April 1985 issue. The first is a SuperBasic multi-coloured sprite designer. The second contains machine code routines to animate the sprites on the screen.

7. Steve Deary	B	Pacman	£1
----------------	---	--------	----

A well-written maze game from the March 1985 issue. Almost 20 screens of increasing difficulty, including an invisible maze, make it a very versatile rendition of the arcade favourite.

8. Andy Carmichael	B	Family Tree	£3
--------------------	---	-------------	----

Based on an article in the August 1985 issue, this is an Archive program and database for setting-up and displaying large family trees.

9. James Lucy	L	Composer	£3
---------------	---	----------	----

Completed in *QL User*, October 1985 this QLiberated program will allow you to compose, play and amend your own melodies. The program will handle sharps, vary tempo, and even specify staccato and legato playing styles.

10. Matthew Capp	B	Miners	£2
------------------	---	--------	----

This interesting simulation, printed in the August 1985 issue, puts you in the role of the NCB, buying and selling coal and mines, hiring and firing miners, and raising or decreasing wages to match economic forces. The object is to be profitable but inexperienced players will find it difficult even to remain solvent.

11. P J Smith	B	DIY Adventure	£1
---------------	---	---------------	----

From the February 1985 issue, this skeleton program requires you to slot in the details to create your own adventure programs.

12. R Green	B	Othello	£1
-------------	---	---------	----

This classic board game, printed in *QL User*, August 1985, can be played by one or two players. The display uses a 3D representation of the board. Average response time by the computer opponent is about 15 seconds.

13. S J Ackers	S	Touch Type	£4
----------------	---	------------	----

This program consists of a 13-lesson course for typing-in letters, words and phrases, a 700-word vocabulary, an interactive keyboard display and a fingering chart inas more than 30K of code. Scores are displayed based on the time and accuracy of typing. A reduced version of the program was printed in the August 1985 issue.

14. Rob Sherratt	A+O	Fcopy	£4
------------------	-----	-------	----

The first part of this program was printed in the March 1986 issue of *QL World*. The program is an ultra-fast, general-purpose file spooler.

15. Alan Prior	B	World Map	£2
----------------	---	-----------	----

From the March 1986 issue, this program will draw a full-screen, multi-coloured map of the world for geography buffs.

16. J M Dower	B	Mushyman	£2
---------------	---	----------	----

Printed in the June and July 1986 issues, this provides speedy SuperBasic arcade action as you munch your way round the screen.

17. Tony Quinn	S	CAD QL	£4
----------------	---	--------	----

CAD design programs are particularly suited to the QL. This version from the September 1986 issue includes features such as rubber-banding and a user-definable symbol library.

18. Stuart Campbell	M+B	Attack of the Things	£3
---------------------	-----	----------------------	----

Typical science fiction horror arcade action as yet more nasties descend on harmless QL owners. Featured in the October 1986 issue of *QL World*.

19. Karl Jeffery	M+B	Starport 2001	£3
------------------	-----	---------------	----

Fast machine code action in this November 1986 version of the *Galaxians* arcade game.

20. Marcus Jeffery	S	QL Go	£4
--------------------	---	-------	----

The oriental game of Go is so complex that even mainframe programs are easily beaten by novice players. To the best of our knowledge, this 15x15 version from the April and May 1986 issues is the only one available for the QL.

21. J P Hartley	B	Britain	£2
-----------------	---	---------	----

Another program for geography buffs from the November 1986 issue of *QL World*. This is a round-Britain geography quiz.

22. KBG Judson	B	Darts	£2
----------------	---	-------	----

Program of the Month from December 1986. This popular pub pastime requires good hand and eye co-ordination to stop a moving cursor on the on-screen board.

EXCHANGE

23. Neil Taylor S
Window Designer £2

This useful routine from the February 1987 issue allows you to set up windows on the screen. A procedure for use in your programs allows you to set the position and size of a window using the cursor keys.

24. J F S Design 3D £4

Tyde man

Published in the March and April 1987 issues, this program will allow you to produce 3D screen designs with the minimum of fuss and aggravation.

25. D Carmona B Stellaris £4

Program of the Month from June 1987. This is an extensive real-time space adventure game against the computer, including economic simulations, lunar landing and superb graphics.

26. Robert A+B+O Video Noble £3

Effects Box 1
These machine code SuperBasic extensions allow you to manipulate your screens, save and recall them from memory and clear them in interesting ways. Program of the Month for July 1987.

27. H R Pendry B Pontoon £3

A graphic version of the classic card game. You play against the computer. Features include changing banker on royal pontoons, accurate betting, five card tricks and so on. Printed in the July 1987 issue of *QL World*.

28. Kenneth B Picture Cameron £2

Puzzle
This short but interesting program from the July 1987 issue sets up an 8x8 sliding block puzzle with on-screen graphics. You can select sliding numbers or load your own picture to solve.

29. Peter B Bridge Etheridge £4

An excellent version of this popular card game. Features include accurate computer bidding, automatic or manual play, replay hands, correct scoring, save and load positions and much more. Essential for card enthusiasts.

30. Charles B Psycho Gerrard £4

Based on an article in the July 1987 issue, this is an excellent version of the famous *Eliza* program. The cartridge contains a script design program, a pre-prepared script containing more than 50 keywords and an application program. Though written in SuperBasic, complex list processing makes this version extremely fast.

31. B Otridge Crossword £5

Sold originally as a commercial program, this is the perfect aid for crossword fanatics. The program provides access by word length to a dictionary of about 12,500 words, to help solve those elusive crossword clues. Note: This program requires two Microdrive cartridges.

32. Phillip B Advent2 £4

Sproston
SuperBasic arcade adventure with a humorous slant. A variety of rooms, robots and problems will keep you on your toes. Full instructions included.

33. Leslie B Clock £3

Fahidy

This is a complete version of the clock program, described in the June and July 1987 issues of our *QL Education* series. An on-screen clock can be used to set or read the time.

34. E. Bamber QL Con- £2

**version/
Calculator**

Comprising weights and measures units conventions and reverse Polish calculation, this excellent utility will convert almost anything to anything. Completely menu-driven, it is very easy to use. Featured in the July 1987 issue.

KEY

B	=	SuperBasic
A+O	=	Assembler and Object Code
M+B	=	Machine Code and Basic Loader
A+B+O	=	Assembler and Basic Loader and Object Code
S	=	Supercharged
L	=	QLiberate

THE ALL-NEW MICRODRIVE EXCHANGE

Microdrive Exchange has always been a popular feature of *Sinclair QL World* and in our constant efforts to improve the magazine, we are expanding the Exchange to bring you even more quality programs at budget prices.

To achieve those results we have altered the format of the Exchange. Rather than calculating the number of sectors required by each program and sending the appropriate number of cartridges, we have now made it a one-program, one-cartridge system. So if you would like, say, four programs, then, regardless of length, you will need four cartridges.

There are a number of advantages to the system. First, the service will be much faster, because programs can be copied in advance. Second, rather than having to ensure having the article for documentation, we will be able to supply Quill documents on the Microdrive, if needed, for future programs.

Finally, for all new programs on the Exchange, rather than just receiving the machine code version, the Supercharged version or whatever, we will be able to supply assembly listings, hex loaders and original SuperBasic versions on the same cartridge, so that you can look at and amend programs.

Naturally, this service will require the transfer of more than the usual number of Microdrives but bear in mind that the number of Microdrives you send will be returned with the software, so for short programs you can squeeze them all on to a single Microdrive. We have reduced the price of Microdrives to £2 per cartridge.

With the new system, we have started to include programs which have not necessarily been featured in the magazine, either because they were too long or because we already had too many listings. Consequently we are now looking for quality programs of any length to feature in Microdrive Exchange. If you have any programs which you feel are good enough, please send them for review. The address and details for program submission is given in The Progs.

See over page for order form.

QL SUPER TOOL KIT II by Tony Tebby
THE ULTIMATE QL ENHANCEMENT

Over 118 Commands:- Full Screen Editor, Key Define Print Using, Last Line Recall, Alkey, Job Control, File Handling, Default Directories, Extended Network.
16K Eprom Cartridge £ 29.90d
Configurable Version on Microdrive £ 28.75d

SANDY PRODUCTS

Sandy SuperQboard (512k, TOOLKIT II etc) £ 215.00d
Sandy 512k THRU-CARD & QJUMP Ram Disc £ 99.00d
Sandy 512k THRU-CARD & QRAM Front End £ 126.50d
Sandy Disc+Printer Interface+Utilities £ 88.09d
SUPER MOUSE/SUPERBOARD
Qram Multitasking Front End By Tony Tebby
Quality Mouse, 512k RAM, SUPER TOOLKIT II,
Disc & Printer Interface, Cadpak Graphics
Complete with Utilities £ 299.92d

QL EPROM HARDWARE

QEPIII ADVANCED EPROM PROGRAMMER menu driven
Probably the most versatile and comprehensive Eprom programmer available
for ANY micro.
2716-27512, 0% -20% vcc, 12.7VPP £ 127.95d
Care Eprom Cartridges each £ 6.90c
Eprom 27128 250n/s 16K £ 5.75c

QL HARDWARE

Single 3.5in. Disc Drive & (Own PSU) £ 125.35a
Dual 3.5in. Disc Drives & (Own PSU) £ 198.95a
QL keyboard Membrane £ 13.80d

MAGNETIC MEDIA

Microdrives (Pkt 4) £ 7.91c
3.5in (each) £ 2.76c
3.5in (per 10) £ 25.30c

QL GAMES

AMBITON By Way Ahead £ 19.95c
Business Orientated Strategy "Super Monopoly"
Ambition simulates a comprehensive environment in which you can pursue a complex business career.
YAHTZEE By Mike Baldwin £ 9.20c
The World's best selling game.

QL LIBERATOR COMPILER

Microdrive Version £ 59.80d

TONY TEBBY Software (QJUMP)

QRAM "new" COMPLETE Q&L MULTITASKING FRONT END A TRULY AMAZING DEVELOPMENT FROM QJUMP POP UP MENUS, FAST RAM DISC, UTILITIES, HOTKEYS SCREEN/WINDOW DUMPS, PRINT SPOOLER ETC £ 29.90d
QIMI QL Internal Mouse Interface. Keeps your Rom port free for Toolkit 2 etc.
A surface mounted P.C.B. which fits inside your QL.
QIMI £ 29.90c
QIMI + GRAM £ 54.97c
QIMI + MOUSE £ 69.92c
QIMI + MOUSE + QRAM £ 89.70c
RAM Disc Software £ 8.05c
QFLP (Micro/P disc interface upgrade) £ 14.95c
QMON II Microdrive £ 19.95c
QMED (Medic disc interface upgrade) £ 14.95c

ZITASOFT Software By Steve Jones

LOCKSMITH copies 99% of protected programmes M/DRIVE — M/DRIVE SOLD for LEGAL use £ 11.50c
4MATTER + LOCKSMITH copies 75% of protected programmes M/DRIVE — DISC £ 23.00c
SHRIVEL memory shrink prog user definable ie 128k or 192k or 256k etc £ 6.90c
TOOLCHEST utilities to allow the creation of customised mdv doctor prog. "On line" help manual. Sector info in Hex & ASCII £ 11.50c

MONITORS 85 Characters (Price including lead)

Philips BM7502 Green Hi-Res £ 89.70a
Philips BM7522 Amber Hi-Res £ 92.00a
Philips CM8833 "new" Colour Med-Res £ 289.80a
Philips AV7300 Tv/Tuner for above £ 74.75b
Hantarex HX-12 Green Hi-Res £ 79.50a

READYMADE LEADS

RGB QL DIN to Phone £ 5.29c
RGB 8-6 pin DIN £ 5.29c
RGB 8-7 pin DIN (Hitachi) £ 6.90c
RGB 8-7 pin DIN (Ferguson) £ 6.90c
RGB 8 pin to SCART (Euro) £ 9.20c
6way PCC 25way 'D' (Printer-Ser1) £ 9.20c

HOW TO ORDER: ALL PRICES INCLUDE VAT

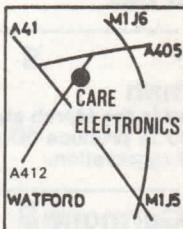
By Post. Enclose your Cheque/P.O. made payable to CARE Electronics. Or use ACCESS/VISA. Allow 7 days for delivery. Please add carriage.

a = £10.35 b = £5.75 c = £1.15 d = £2.30

CARE
ELECTRONICS

800 ST ALBANS ROAD,
GARSTON, WATFORD,
HERTS. WD2-6NL.

Tel: 0923-672102



NEW PRODUCT
TOOLCHEST
QIMI + MOUSE
YAHTZEE GAME



Mike McKenzie on (089) 293

4783

£2.75 overseas

Address:

PO Box 74

Tonbridge

TN12 6DW

BACK ISSUE/REPRINT ORDER FORM

Name _____ Address _____

Issue required _____ Reprint required _____

ORDER FORM

No. of programs required

No. of drives required

No. of drives sent

Total cost of programs

Drive cost (£2 each)

Sub-total

Postage & packing

Program 'ID' Numbers

+ 15% VAT

£

GRAND TOTAL

£

-10% DISCOUNT FOR QL

£

GOLD CARD HOLDER

£

TOTAL TO BE SENT

£

QL GOLD CARD NUMBER (IF ANY)

--	--	--	--	--	--

Name _____

Address _____

Please copy on to Microdrive the programs above which I have indicated by their 'ID' numbers. I enclose a cheque/PO to the value of £..... made payable to *Sinclair QL World*. I understand that *Sinclair QL World* undertakes to supply only these programs — copied on to Microdrive — and accepts no liability for their operation as defined by the author. Neither can *Sinclair QL World* supply additional information about any of the programs other than that originally printed or supplied. Any article reprints must be ordered and paid for separately at £2 each inclusive of post and packing — £3 overseas.

INSTANT

HARDWARE

ABC Electronic

010 49 521 898081

Mouse/Software

Astracom

0792 473697

Modem

Care Electronics

0923 672102

Software and hardware specialist. Sandy official distributor. Q Jump official distributor. Wide range of leads available.

Chromographica

Colour monitor, high resolution, low cost. Full details from Chromographica, 135 Cliff Road, Hornsea, North Humberside HU18 1JB or telephone 04012 4699.

Computer Supplies

146 Church Road, Boston, Lincs.

Joysticks

Comware

0270 582301

Disc Drives, Memory, Monitors/Software

CST

24 Green Street, Stevenage, Herts SG1 3DS.

Tel: (0438) 352150

Supplies of QL storage devices including QDisc, Interface and Ram drives 3.5in./5.25in., Dual 720K 3.5in. floppy disc drives, Ram plus 512K expansion QDisk and dual floppy, 20 MB Winchester, Q488 IEEE GP1B interface, QEP-111 Eprom programmer. Also supplies of Thor 1F, 2F, WF. Telephone for details.

Cumana Ltd

0483 503121

Disc Drives/Interface

Data Distributors Ltd

0990 28921

Kaga, Sinclair Vision

Datalink

031 554 6040

Printer interfaces

D. J. W. Software

11 Pound Close, Bramley, Hampshire, RG26 5BL

Eidersoft

0708 851099

QL Mouse, Disc Drives/Software

Eprom Services

0532 667183

Tony Firshman Services

01-724 9053

Mains spike filter

4 Systems

01-844 1399

Hardware and software

Kempston Ltd

0234 856633

Disc/Centronics interface

Management Science Ltd

17 West Hill, London, SW18

QL Case/Software

Micro Peripherals Ltd

0256 473232

Disc Drives/interfaces

Microworld

0293 545630/0273 6711863

Printers and monitors

Mirage Systems

0272 603871

Expanderam 512K/Software

Opus Supplies Ltd

Redhill 65080

PCML Ltd

0372 67282/68631

QL & RAM cards/Software

Penman Products Ltd

0903 209081

Penman plotters

Sandy (U.K.) P.C.P.

0234 219814

QLT, Disc systems, SuperQboard, RAM boards

Silicon Express

0533 374917

Disc interface/drives, Centronics interface, RAM boards, Monitors, Printers

Slave Software

050 846 8866

Q Disc/Software

SMC Supplies

01-441 1282

Joystick adaptor, Centronics and Epson Serial

Strong Computer Systems

0267 231246

Printers and Monitors/Software

T.K. Computerware

0303 812052

Stockist

Tandata

06845 68421

Q-Connect, Q-Mod, Q-Call

Technology Research Ltd

0784 63547

Disc interface with RAM and Centronics port

Transform Ltd

089 283 4783

QL dust cover, Microdrive storage box, RS232 lead, disc drives, monitors and printers

Viglen Computer Supplies

01-8112 9902

SOFTWARE

Adder Publishing Ltd

0223 277050

Utilities

Ark Distribution

Corve Farm House, Chale Green, Ventnor PO38 2LA. Tel: 098-379 496

Specialists in Archive systems for QL/PC/OPD computers and File Conversion/Recovery/Transfer Services. Our systems include Archivist (£29.95) a powerful all purpose text manager, Card File (£14.95/£19.95), A specialist addressing system, Mail File (£14.95/£19.95). A general addressing system with notes, Librarian (£19.95/£24.95), for cataloguing items like books, articles, records and videos, and Mail Merge (multi tasking) for producing quantities of formatted reports. Using an archive export file and a quill Lis file.

Breakthrough Software

0763 45482

Utilities

Bridgebrook Intek

45 Burleigh Avenue, Wallington, Surrey

Utilities

Business Software

01-863 1861

Utilities

Collins Soft

Freepost, 30, London W1E 7JZ

Utilities

Consumers Association

Subscription Dept, PO Box 44, Hertford, SG14 1SH

Utilities

C.P. Software

10 Alexandra Road, Harrogate

Games

D. A. Bandoo

81 Mount Pleasant, Wembley

Utilities

N. Alexander

53 Allen Road, Wolverhampton, West Midlands

Utilities

New Horizons Software

Fourwinds, 30 Cwm Lane, Rogerstone, Gwent

Games

Owl Computer Training

044 282 7302

Utilities

Paddy Software

0726 832718

Utilities

Palantir Products

60 St Lukes Road, Bedminster, Bristol

Utilities

D. J. Walker

22 Kimptons Mead, Potters Bar, Herts EN6

Utilities

D. S. Enterprises

01-671 0209

For the best deal in town on drives interfaces extra memory, software, discs, books and while stocks last used-once Microdrive cartridges. Our own software includes Ran. Disk (world's fastest), sign designer and multi Task.

Data Management

0904 760351

Utilities

Datalink Systems

097081 360

Utilities & Games

Digital Precision

01-527 5493

Utilities & Games

D.R.K. Products Ltd

Bar 1, Pipers Lane, Markgate, St Albans, Herts AL3 8QF

Micro Cartridge Rack

D. S. Enterprises

01-671 0209

Utilities

Eigen Software

45 Bancroft Road, Widnes, Cheshire WA8

OLR

Games

Equate

2 Ffordd Derwyn, Penyffordd, Chester CH4 0JT

Utilities and games

Gemini Marketing

0395 265165

Utilities and games

G. S. T. Computer Systems

0954 81991

Utilities

Hisoft

0582 696421

Utilities

Intek Software

01-500 8534

Utilities

J. & D. Software

3 Alfred Road, Lowtown, Warrington

Key Software

0703 695182

Games and utilities

McGraw-Hill

0628 23431

Utilities

MetaComCo

0272 428781

Utilities

Microprocessor Engineering Ltd

Hanley Road, Southwater, Horsham, Sussex

Games and utilities

MicroApl

01-622 0395

Games and utilities

Microdeal

QL Software available from Microdeal PO Box 68, St Austell, Cornwall PL25 4YB.

The King £7.50 multi-screen Kong arcade game. Aquanaut 471 £14 graphic adventure/over 100 screens. Lands of Havoc £10 2000 screen graphic adventure. Cuthbert in Space £7.50 arcade zap em up. Crazy Painter £5 zany paint the floor game. Hopper £5 original Frogger-style arcade game

N. Alexander

53 Allen Road, Wolverhampton, West Midlands

Utilities

New Horizons Software

Fourwinds, 30 Cwm Lane, Rogerstone, Gwent

Games

Owl Computer Training

044 282 7302

Utilities

Paddy Software

0726 832718

Utilities

Palantir Products

60 St Lukes Road, Bedminster, Bristol

Utilities

PCS

8 Oakgrove Way, Bridgewater, Somerset

PCS Utilities

Peakcrown Ltd

4 Beeby Road, Scrattoft, Leicestershire LE7 9SG

Games

Peak Electronics

32 Clifton Avenue, Hartlepool, Cleveland

Utilities

Plantir Products

60 St Luke St, Bedminster, Bristol

Utilities

Portfolio Software

PO Box 15, London SW11

Position Computing

0554 759624

Utilities

Prentice Hall

0442 58531

Utilities

Prospero Software

Pro Fortran-77 is a full Ansi Specification

Fortran 77 compiler for the QL. Pro Pascal is a full ISO specification Pascal compiler for the QL. Both consist of a 200-page manual, ROM cartridge and three Microdrives, and run on unexpanded 128K QL. Price £99.95 including VAT from Prospero Software Ltd, 190 Castelnau, London SW13 9DH. Enquiries and credit card orders to 01-741 8531.

Psientific Software

0482 649187

Utilities

Psion

01-723 9408/0553

Games and utilities

Pyramide

01-349 2764

Games and utilities

QCode

0235 28359

Games and utilities

Qflash

Hamburg 6512742

Utilities

Qjump

0954 50800

Utilities

QSoft

INSTANT ACCESS

TR Computer Systems
093 924 621
Utilities
WD Software
0534 81392
Utilities
ZitaSoft
Steve Jones, 93 Foxbourne Road, London SW17 8EN
Utilities



QL REPAIRS
ANY FAULT £27.95 INCLUSIVE OF P&P, VAT INSURANCE AND 3 MONTHS GUARANTEE. FOR REPAIRS ON OTHER MICROS PHONE FOR DETAILS.

SUREDATA

Telephone: 01-902 5218

UNIT 6, STANLEY HOUSE
STANLEY AVENUE, WEMBLEY
MIDDX. HA9 4JBQ



NEW QL BOOK!
TAKING THE QUANTUM LEAP:
The Last Word on the Sinclair QL
by Mike de Sosa

The only QL book to cover the latest advances in hardware and software. Chock full of useful programs and examples. Fully illustrated, 280 pages. No QL owner should be without it!

£17.00 + £3 shipping
\$26.00 + \$3 shipping
U.S. Customers
(503) 824-2658

EXCLUSIVELY AVAILABLE FROM:

TIME DESIGNS
29722 Hull Rd
Colton, Oregon 97017
U.S.A.
(503) 824-2658



curry computer

Your Complete Sinclair Stockist

Hardware, Software, Peripherals,
Printers, Books, Magazines, Accessories
P.O. Box 5607 • Glendale, AZ 85312-5607 U.S.A.
1-602-978-2902 • Telex (via WUI): 6501267701
DEALER INQUIRIES WELCOME

PROBLEMS WITH YOUR QL!

FOR FAST, RELIABLE AND PROFESSIONAL REPAIRS AT COMPETITIVE PRICES

CONTACT:-

PM ENGINEERING

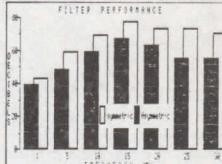
UNIT 8, NEW ROAD, ST IVES,
CAMBRIDGESHIRE. PE17-4BG

ST IVES (0480) 61394

"NEW RIBBONS FOR OLD"
from
ALADDIN
ALADDIN WILL RE-INK YOUR OLD FABRIC RIBBONS AT GREAT SAVINGS AGAINST NEW PRICES!
INTRODUCTORY OFFER
Send a dry fabric ribbon cassette (stating printer make and model) with £2 and we'll re-ink it and quote you for future re-inkings.
ALADDIN (Dept QL), 4 Hurker Crescent, Eyemouth, Berwickshire TD14 5AP. Or phone for a quotation: 08907 50965

QL POOLSWINNER VERSION 2.0
THE ULTIMATE POOLS PREDICTION PROGRAM
• IMPROVED MASSIVE DATABASE Poolswinner is a sophisticated pools prediction aid and took over 4000 hours to complete. It comes complete with large database with over 35,000 matches since 1969. All English and Scottish team names included.
• FORECASTS score draws and no score draws with ball in perm generator and faster than version 1.0—mark your coupon direct from screen.
• SUCCESSFUL We guarantee that POOLSWINNER performs considerably better than chance. If you can prove otherwise we shall refund.
• UNIQUE The prediction formula calculates the efficiency of every team with precision and accuracy—but no tedious typing. We have yet to see a predictor that uses this method.
ONLY £14.99 on microdrive cartridge
SAME DAY DESPATCH FROM:
XENON, 24 WHARNCLIFFE STREET,
BARNSLEY, SOUTH YORKSHIRE S70 5BP

Tony Firshman Services COMPUTER CLEANERS



Many computer systems, disc drives, printers, modems, telex machines, Hi-Fi and CD systems are sensitive to 'dirty' power supplies. Voltage spikes or electromagnetic (RF) interference sent down power supplies when neighbouring equipment is switched or lightning strikes can crash or damage systems and corrupt data. We manufacture three products designed to overcome this problem — two adaptors (5a fuses with one and three 3-pin sockets respectively and a 4-way socket (13a) with trailing lead similar filtering circuitry). They can also reduce mains borne noise between computers and cordless phones/FM intercoms.

SPECIFICATION

1. Capacitive Delta filter to BS 2136. LIN capacity boosted to over 430n with a discharge resistor to prevent shocks.
2. Inductive EMF RF chokes rated to 130MHz used in series. Clipped voltage spikes smoothed.
3. Spike suppressors (VDR) fitted (LIN, LE, NE) to short voltages above 530V. (peak current .1200A. 130 joules dissipation. Response time < 10 ns) (only 1 in 1-way).

All circuits are in standard square pin devices and are plug in — NO WIRING REQUIRED.

1-way adaptor £14
3-way adaptor £18
4-way trailing socket £24

PRICES ARE FULLY INCLUSIVE



"The cleaner has been in operation for a month with my QL and I am glad to report that locking up problems appear to be a thing of the past. Many thanks for your help, efficiency and, above all, for producing such an effective device" — N Dugdale, New Zealand

Supplier to the DHSS, MOD, Universities, Schools, Hospitals and Police Authorities

12 Bouverie Place, London W2 1RB. Tel: 01-724 9053
Telex: 265451 MONREF G (quoting BT Gold 72: MAG90645)

TAXAN/KAGA AND CANON PRINTER OWNERS

(TAXAN KP810, KP910 and CANON PW1080A, PW1156A)

IF YOU WOULD LIKE THE HIGHEST QUALITY PRINTER OUTPUT, THEN WRITE OR PHONE FOR A (FREE) 7 PAGE DEMONSTRATION OF "CuePrint" with "Printer Toolkit"

MUST BE SEEN TO BE BELIEVED!

(LIKELY TO MAKE OTHER COMPUTER/PRINTER OWNERS ENVIOUS)

D. A. BURRIDGE, 23 CROMWELL AVENUE, HAMMERSMITH, LONDON W6 9LA. TEL: 01-748 3437

ESCAPE Software

★★★★★ Special Introductory Offers ★★★★★

QL SPELLING & MATHS TUTORS

QL SPELLING TUTOR

A menu-driven package that teaches spelling using a variety of proven techniques. Suitable for 5 year olds to adults. Use built in graded vocabulary of over 3100 words or build up your own word lists. Also included are Hangman, Anagram and Word-Search games.

QL MATHS TUTOR

A menu-driven package that teaches basic arithmetical, geometrical and logical concepts. Aimed at the 5 to 13 age group, but so user-friendly that even an adult could use it! Also included are Nim and Hi-Lo games.

QL SPELLING TUTOR and QL MATHS TUTOR were compiled using Q-LIBERATOR

— Offer price: £11.50 each inclusive —

— Save 10%: buy both programs for £20.70! —

Send cheques or P.O.'s to:

ESCAPE Software (Dept. QLW)
2 Henley Road, Ilford, Essex IG1 2TT

Overseas orders add £1

QL SMALL TRADERS PACK

New, enhanced QUICK-LOADING version 2! Accounts, Stock Control, Mailing List, Label Printer, Phone File, mini-calc plus utilities. "Simple to use, a good deal for the money." (QL WORLD) "Fully menu-driven & Epson-compatible" Supplied on two mdvs for only £24.95 (£10 update) QL INVOICER — prints smart invoices & statements on plain paper. Only £14.95 (£9.95 with Pack) QL BANK ACCOUNT £9.95 QL FILOFAX (4 progs) £9.95 Send SAE for full details:

SD MICROSYSTEMS,
(DEPT QL), P.O. BOX 24
HITCHIN HERTS UK.

MICRO Ads

You can advertise your own business in QL World for as little as £15 inc VAT for a minimum of 30 words. Send details along with your name, address and telephone number to Classified, Sinclair QL World, Greencoat House, Francis Street, London SW1P 1DG or ring Jane Brookes Wadham 01-834 1717.

SANDY QL SPECIALS

—NEW PRODUCTS—

SUPERMOUSE FOR SUPERBOARDS — factory fitted upgrade provides high quality mouse with full pointer/real windowing/multi-tasking front end plus QRAM UTILITIES from QJUMP and CADPAK graphics program.

SUPERDISK — 3.5"/5.25" disk interface & parallel printer port with RAMDISKS, disk management utilities: compatible with all memory expansions/ROMs — tremendous value!

CP/MULATOR — A complete CP/Mulator to open the vast CP/M software library to the QL.

QPLUS+ — customise your QL front end — generates a system disk or microdrive to match your exact set up. Single key menus/printer select/special commands/comprehensive manual.

FUTURA 68000 PC — fully QL compatible — the machine of the year from Tony Tebby and Sandy Technology.

—HARDWARE—

SINCLAIR QL 128K	120.00	QEP EPROM CARTRIDGE	5.99
SINCLAIR QL 640K	199.00	SCHÖN KEYBOARD	£54.75
THRU-CON RAM CARD 512K	99.00	STEM VIDEO DIGITIZER	£150.00
SUPERDISK INTERFACE	85.00	10 VERBATIM 3.5" DSDD DISKS	24.99
SUPERQBOARD	OK RAM	MICRODRIVE PACK OF 4	6.99
	512K RAM	NEW MICRODRIVE CART LOOSE/10	16.65
SQB MOUSE 512K RAM	200.00	PARALLEL PRINTER CABLE	8.50
SQB UPGRADE	0-512K	QL KEYBOARD MEMBRANE IN STOCK	
SQB SUPERMOUSE UPGRADE	87.00	QL SPARES/FAST REPAIRS	
SINGLE 3.5" DISK DRIVE	125.00	QRAM	29.90
DUAL 3.5" DISK DRIVE	190.00	CPM EMULATOR FOR QL	44.95
BARE DISK DRIVE NEC 3.5"	80.00		
MICROVITEC CUB MONITOR			
COLOUR	254.00	—SOFTWARE—	
FIDELITY QL 14"		RAM DISK	7.50
COLOUR MONITOR	178.00	QPLUS+	14.95
BOXER 12 HI-RES GREEN	94.50	QRAM FROM QJUMP	29.90
QEP 111 EPROM PROGRAMMER	115.00		

SUPERQBOARD — The most sophisticated peripheral for the QL: fast RAM: 5.25"/3.5" multi-standard disk interface: parallel printer port: spooler: ramdisks: disk management software: full Supertoolkit II from Tony Tebby: extensive manual: all on one small plug-in card.

**SANDY (UK) PCP LTD.
UNIT 33, MURDOCK ROAD,
MANTON LANE, BEDFORD MK41 7PQ**

**TELEPHONE (0234) 219814 FAX (0234) 270133 TELEX 82392
Export enquiries welcome**

SPECIAL OFFER

**SUPERDISK INTERFACE + SINGLE 3.5"
DS/DD DISK DRIVE.
RING FOR DETAILS.**



STRONG COMPUTER SYSTEMS

BRYN COTTAGE, PENIEL, CARMARTHEN, DYFED SA32 7DJ. TEL: 0287-231246

THE ASTRACOM 1000 MULTISTANDARD INTELLIGENT MODEM £198.00

Complete with Communications Software ** NOW WITH BT APPROVAL **

128K QL COMPUTER £149.00 640 QL COMPUTER £239.00

SILVER REED PLOTTER WITH TALENT TECHNIKIT ONLY £199.00

QUALITY PRINTER STAND - Suitable for any 80 Col Printer ONLY..... £59.00

Small Footprint & Dial Control For Smooth Paper Feed

** ALL THOR COMPUTER SYSTEMS SUPPLIED

PLEASE PHONE FOR LATEST PRICES **

NEW!

NEW!

*** TONY TEBBY'S NEW PRODUCTS ***

QRAM: MULTITASKING, WINDOW CONTROL UTILITIES ETC. £29.00

QRAM + QUALITY MOUSE + INTERNAL MOUSE INTERFACE..... £89.00

QUALITY MOUSE + INTERNAL MOUSE INTERFACE £69.00

*** NEW FROM MIRACLE SYSTEMS ***

TRUMPCARD: THE NEW DISK INTERFACE + RAM UPGRADE FROM MIRACLE SYSTEMS INCLUDES 768K OF RAM UPGRADING YOUR QL TO A TOTAL OF 896K RAM + TOOLKIT II + MULTI MODE SCREEN DUMPS + RAM DISK & PRINT SPOOLER

TRUMPCARD WITH FREE QRAM ONLY..... £199.00

SPELL BOUND: SPELLING CHECKERS WITH 30,000 WORD DICTIONARY

£29.00

MCS MULTIROM: COPY ROMS TO DISK ACCESS UP TO 4 ROMS AT ONCE FROM RAM £56.00

MEMODISK INCLUDES DISK INTERFACE + 512K RAM + MANY UTILITIES	£199.00
ABOVE WITH NEC DUAL DRIVES	£399.00
NEC DUAL 3.5" DISK DRIVES	£209.00
NEC DUAL DRIVES + INTERFACE £279.00	SCHON KEYBOARD..... £ 57.00
512K EXPANDERAM	£ 99.00 INTERNAL DIY 512K RAM £ 99.00
10 DS/DD 3.5" DISKS IN CASE £ 26.00	LOCKUP BOX FOR 40 3.5" DISKS £14.00
SPECIAL OFFER: 20 3.5" DISK + FREE STORAGE FOR 40 DISKS	£ 52.00

SPECIAL OFFER: 6 BOOKS ONLY £19.00

THE QDOS COMPANION

ASSEMBLY LANGUAGE ON THE SINCLAIR QL

QL ADVENTURES

MATHS ON THE QL

ARTIFICIAL INTELLIGENCE

DEVELOPING APPLICATIONS

PRINTER PRICES INCLUDE MIRACLE SYSTEMS INTERFACE

SEIKOSHA 1300AI 300 CPS (colour option £100 extra)	£399.00	CLEANING KIT IN CARRYING CASE.....	£ 27.00
EX DEMO PRINTERS AVAILABLE PHONE FOR LATEST PRICES		3250 WATT MAINS FILTER	£ 36.00
SEIKOSHA SP180	£189.00	MIRACLE SYSTEMS MODAPTOR	£ 39.00
CANON PW1080	£289.00	MICROSTICK JOYSTICK WITH ADAPTOR	£ 16.00
KAGA TAXAN KP910 WIDE CARRIAGE EX DEMO	£350.00	20 CARTRIDGES WITH TRANSFORM BOX	£ 40.00
DAISEYWHEEL MP26 (26 CPS) QUME COMPATIBLE.....	£299.00	10 CARTRIDGES WITH TRANSFORM BOX	£ 23.00
2000 Sheets Fanfold Paper Micro Perf	£ 19.00	4 Microdrive Cartridges	£ 8.00
2000 Sheets Fanfold Paper (supplied with printer)	£ 16.00	Joystick Adaptor	£ 5.00
MIRACLE SYSTEMS PARALLEL INTERFACE.....	£ 20.00	Serial Printer Cable	£ 8.00
		Transform Box.....	£ 5.00
		Para Cable for Memodisk	£10.00
		10 DS/DD 5.25" Disks	£19.00

MONITORS (Cables Included)

Microvitic Cub 1451/DQ Colour	£249.00	BROTHER M1009	£ 5.00	MT80 or Shinwa	£ 6.00
Microvitic Cub 1451/DQT3 With Swivel Stand	£269.00	QUEN DATA	£ 6.00	SP1000A (Sinclair)	£ 7.50
Swivel Stand For Microvitic	£ 25.00	TAXAN/CANON	£ 8.00	EPSON RX/MX/FX	£ 6.50
Phillips BM7502 20 MHZ Green (RECOMMENDED FOR THE QL).....	£ 99.00	EPSON LX80	£ 5.00	CITIZEN 120D	£ 6.50

BUSINESS

CASH TRADER.....ON CART	£ 39.00
PROJECT PLANNER	£ 24.00
DECISION MAKER	£ 24.00
ENTREPRENEUR	£ 24.00
QL HOME FINANCE	£ 21.00
PCB DESIGNER1	£ 89.00
PCB DESIGNER 2	£ 89.00
TALENT TECHNIQL	£ 44.00
CONCEPT 3D CAD	£ 34.00
RUBICON VIEWPOINT	£ 24.95
DIGITAL EYE Q	£ 24.00
QDRAW	£ 14.00
SIGN DESIGNER.....	£ 24.00
FRONT PAGE	£ 22.50
PRO ASTROLOGER CART/DISK	£ 49.00
PRO ASTROLOGER + ASTRONOMER	£ 59.00
QL SERVICE MANUAL.....	£ 19.00
PROCAD 3	£ 39.00
THE QL INVESTMENT MONITOR	£ 19.00

LEISURE

TALENT WEST	£ 12.00
TALENT ZKUL	£ 12.00
TALENT COSMOS	£ 12.00
TALENT THE LOST PHAROH	£ 13.00
TALENT JUNGLE EDDI	£ 13.00
TALENT NEMESIS.....	£ 13.00
TALENT OXFORD TRIVIA	£ 16.00
TALENT STRIP POKER	£ 13.00
SELLASOFT TANKBUSTERS	£ 14.00
DIGITAL SUPERBACKGAMMON	£ 11.00
DIGITAL BLOCKI ANDS	£ 9.00

LANGUAGES

GST MACRO ASSMBLER	£ 34.00
METACOMCO ASSEMBLER	£ 29.00
METACOMCO BCPL	£ 49.00
METACOMCO LISP	£ 49.00
METACOMCO PASCAL.....	£ 69.00
METACOMCO 'C'	£ 79.00
METACOMCO APL	£ 89.00
PRO FORTAN 77	£ 89.00
PRO PASCAL	£ 89.00
QL LIBERATOR.....	£ 69.00
DIGITAL TURBO	£ 89.00
TALENT WORKBENCH	£ 19.00
SUPERCHARGE COMPILER	£ 49.00
FORTH + REVERSI	£ 35.00

UTILITIES

QLI ASH RAMDISK/TOOL KIT (CART)	£ 19.00
QLI ASH RAMDISK/TOOL KIT (EPROM)	£ 25.00
TOOL KIT II ON EPROM	£ 29.00
TOOL KIT II ON CART	£ 28.00
DIGITAL MEDIA MANAGER	£ 35.00
THE EDITOR ON CART (128K VER.)	£ 24.00
THE EDITOR ON DISK (640K VER)	£ 39.00
TALENT TECHNIKIT	£ 24.00
TALENT QIMP	£ 29.00
TALENT BASIC AIY	£ 29.00
DISK & PRINT SPOILER.....	£ 9.00
TALENT SIDEWAYS	£ 19.00
DIGITAL SPRITE GENERATOR	£ 29.00
SECTOR TASKMASTER	£ 25.00
TURBO TOOL KIT	£ 19.00
QMON MONITOR/DEBUGGER	£ 18.00
TALENT CARTRIDGE DOCTOR	£ 13.00
BETTER BASIC EXPERT SYSTEM	£ 29.00

BRIDGE PI AYER II	£ 17.00
WAR IN THE EAST COMPLETE	£ 39.00
WAR IN THE EAST (SCEN. 1)	£ 20.00
WAR IN THE EAST (SCEN. 2 or 3)	£ 13.00
PSION CHESS	£ 16.00
PSION MATCHPOINT	£ 12.00
SQUADRONS	£ 13.00
TOUCH TYPIST	£ 12.00
DATA INK 3D SIIME	£ 11.00
HEART OF GERN (NEW ADVENTURE)	£ 15.00
DIGITAL SUPER ASTROLOGER	£ 22.00
OMEGA	£ 14.00

Software

EIDERSOFT SPOOK	£ 9.00
EIDERSOFT BJ 3D	£ 9.00
EIDERSOFT BJ RETURNS	£ 9.00
EIDERSOFT KARATE	£ 9.00
EIDERSOFT CITADEL	£ 9.00
EIDERSOFT ZAPPER WITH EAGLE	£ 8.00
RUBICON DRAGONHOLD	£ 14.00
LEISURE GENIUS SCRABBLE	£ 12.00
HYPERDRIVE	£ 12.00
STEVE DAVIS SNOKER	£ 12.00
DIGITAL SUPER ARCADIA	£ 9.00
DIGITAL DROIDZONE	£ 9.00

ALL PRICES INCLUDE VAT & CARRIAGE